REVISED SITE INSPECTION WORKSHEETS
FOR
AT&T (FORMER)
NORTH ANDOVER, MASSACHUSETTS

CERCLIS NO. MAD982547317

SITE INSPECTION
RESPONSE ACTION CONTRACT (RAC), REGION I

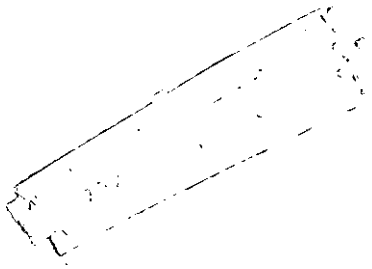
Prepared for:
U.S. Environmental Protection Agency
Region I
Office of Site Remediation and Restoration
Boston, MA 02114-2023

EPA CONTRACT NO. 68-W6-0045
EPA WORK ASSIGNMENT NO. 032-SISI-01ZZ

TtNUS PROJECT NO. N0073-1800
TtNUS DOCUMENT NO. RI01620R

Submitted by:

Tetra Tech NUS, Inc.
55 Jonspin Road
Wilmington, MA 01887



August 2001

SITE INSPECTION WORKSHEETS
(Region I version 6/30/95)

WARNING!!
EPA has determined that the HRS score of any site that is progressing towards listing on the NPL is confidential. Deliberations regarding scoring or listing issues, the site specific status, and HRS scores cannot be released or discussed with non-Agency persons. For additional guidance see the April 30, 1993 OSWER Directive 9320.1-11.

SITE LOCATION			
Site Name: AT&T (former)			
Street Address: 1600 Osgood Street			
City: North Andover	State: MA	Zip Code: 01845	Telephone: NA
CERCLIS ID No.: MAD982547317	Coordinates: Latitude: 42° 43′ 54.1 ″ N Longitude: 71° 06′ 58.9 ″ W		

OWNER/OPERATOR IDENTIFICATION					
Owner: Lucent Technologies Optical Networks Group			Operator: E. F. Newland, Jr.		
Owner Address: 1600 Osgood Street			Operator Address: 1600 Osgood Street		
City: North Andover			City: North Andover		
State: MA	Zip Code: 01845	Telephone: (978) 960 - 3311	State: MA	Zip Code: 01845	Telephone: (978) 960 - 3311

SITE EVALUATION	
Agency/Organization: TtNUS/RAC	SI Work Assignment No. 032-SISI-01ZZ
Investigator: Lisa LaForge	Date: August 2001

EPA CONTACT		
EPA SAM: Nancy Smith		
Address: One Congress Street		
City: Boston	State: MA	Zip Code: 02114
Telephone: (617) 918-1436		
EPA Reviewer:	Date:	

GENERAL INFORMATION

Site Description and Operational History: Provide a brief description of the site and its operational history. State the site name, owner, operator, type of facility and operations, size of property, active or inactive status, and years of waste generation. Summarize waste treatment, storage, or disposal activities that have or may have occurred at the site; note whether these activities are documented or alleged. Identify all source types and prior spills, floods, or fires. Summarize highlights of the PA and other investigations. Cite references.

The AT&T (former) property is located at 1600 Osgood Street (Route 125) in North Andover, Essex County, Massachusetts. The geographic coordinates as measured from the center of the property are 42° 43′ 54.1″ north latitude and 71° 06′ 58.9″ west longitude (Figure 1) [5; 6]. The property is currently owned and operated by Lucent Technologies Optical Networks Group (Lucent). The 168-acre property is characterized as 115 acres developed, 40 acres in woodlands, 5 acres wetlands, and 8 acres of floodplain (Figure 2) [1, p. 1-1].

The property is bound to the east by Osgood Street (Route 125), to the north and northwest by a Boston and Maine Railroad easement and then the Merrimack River, and to the south and southwest by an unnamed stream and the Holt Road Landfill [10]. The topography of the property is generally flat with a gentle slope towards the Merrimack River [10]. The surface water runoff is captured by a series of catch basins and directed to a storm water piping network that conveys the water to one of three culverts for discharge to the Merrimack River [10; 36]. The property's elevation varies between 30 feet (ft) in the northwest corner of the property to 48 ft on the eastern portion of the property [1, p. 4-1]. The property is located in an industrial section of North Andover [2, p. 1].

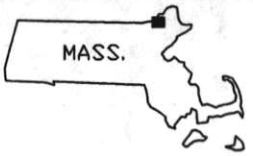
In 1956, the AT&T Merrimack Valley Works facility was constructed on former farm land [1, p. ii]. Information pertaining to the owners of the property prior to 1956 was not included in the available file. From 1956 to 1996, the AT&T (former) property was used to manufacture telecommunication transmission equipment. In 1996, AT&T Corporation transferred ownership and operational control of the Merrimack Valley Works to Lucent Technologies, Inc. [36]. Since 1996, Lucent has used the facility to design, test, and assemble telecommunication transmission equipment [10].

AT&T (former) used various industrial solvents, etchants, and other chemicals in their manufacturing and assembly processes. AT&T (former) was listed as a generator of hazardous waste on Resource Conservation and Recovery Information System (RCRIS) [2, p.2]. Currently, Lucent is listed as a large quantity generator of hazardous waste on RCRIS [26]. Several organic materials were typically stored on the property in the past in both underground storage tanks (USTs) and drums, which included trichloroethylene (TCE), toluene, acetone, varsol, methyl chloroform, gasoline, ammonia etchant, waste solvents, waste acetone and water mixture, spent ammonia etchant, spent copper electroplating solution, and spent brulin (etchant) [2, p. 2].

BASE MAP IS A PORTION OF THE FOLLOWING 7.5 X 15 MINUTE USGS QUADRANGLES:
HAVERHILL, MASSACHUSETTS-NEW HAMPSHIRE, 1987;
LAWRENCE, MASSACHUSETTS-NEW HAMPSHIRE, 1987.

GRAPHIC SCALE

0 MILE 0.5 MILE 1 MILE

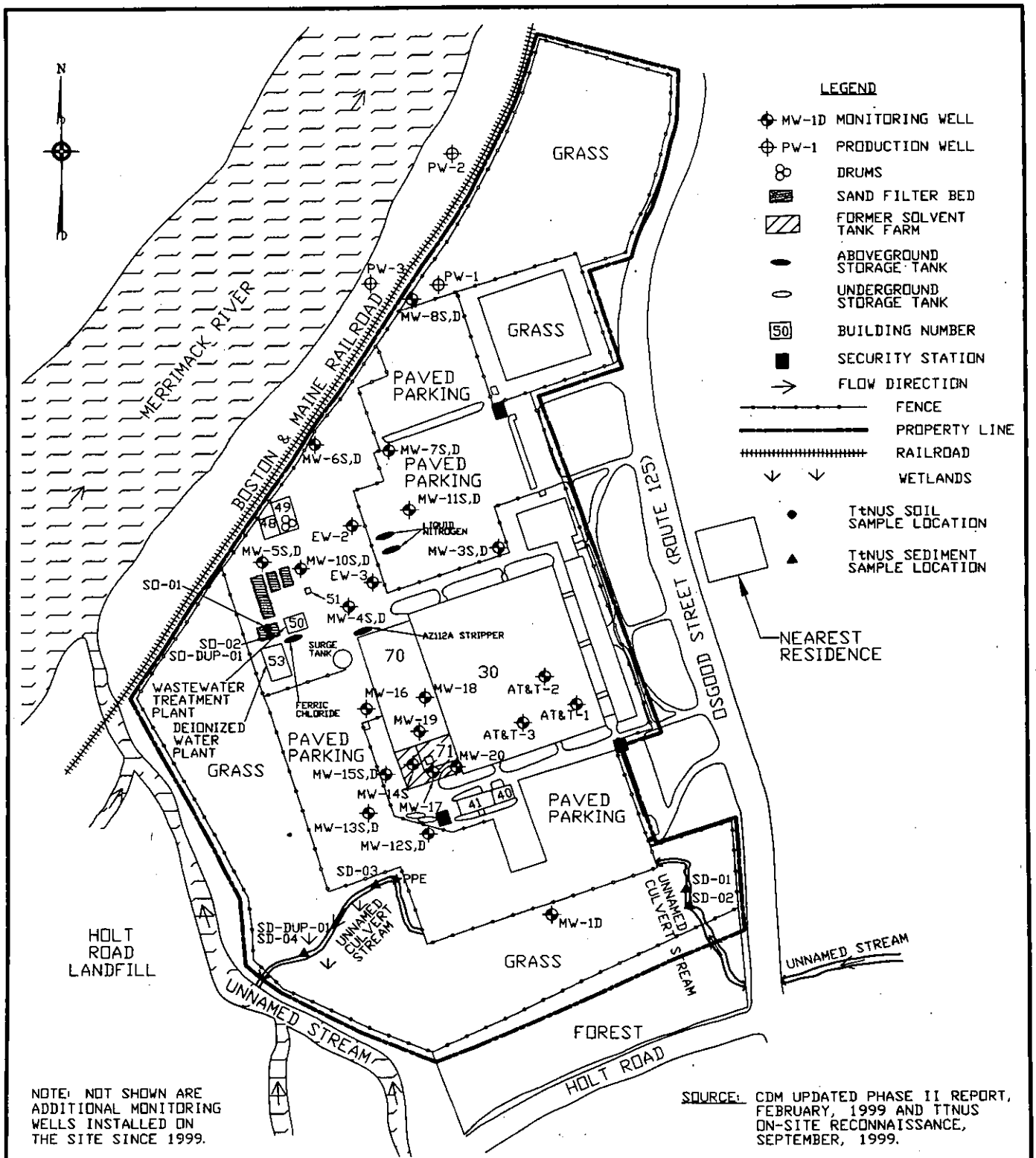


QUADRANGLE LOCATION

SITE LOCUS		FIGURE 1	
AT & T (FORMER)			
NORTH ANDOVER, MASSACHUSETTS			
DRAWN BY:	D.W. MACDOUGALL	REV.:	0
CHECKED BY:	J. PILLION	DATE:	JULY 26, 2000
SCALE:	AS NOTED	ACAD NAME:	DWG\0073\1880\FIG_1.DWG

TETRA TECH NUS, INC.

55 Jonspin Road Wilmington, MA 01887
(978)658-7899



NOTE: NOT SHOWN ARE ADDITIONAL MONITORING WELLS INSTALLED ON THE SITE SINCE 1999.

SOURCE: CDM UPDATED PHASE II REPORT, FEBRUARY, 1999 AND TTNUS ON-SITE RECONNAISSANCE, SEPTEMBER, 1999.

SITE SKETCH	FIGURE 2
AT & T (FORMER)	
NORTH ANDOVER, MASSACHUSETTS	
DRAWN BY: D.W. MACDOUGALL	REV.: 1
CHECKED BY: J. PILLION	DATE: JULY 26, 2001
SCALE: NOT TO SCALE	ACAD NAME: DWG\0073\1880\FIG_2.DWG

TETRA TECH NUS, INC.
55 Jonspin Road Wilmington, MA 01887
(978)658-7899

In 1986, AT&T initiated operations to remove, replace, and/or decommission USTs and associated piping for more efficiency in maintenance and monitoring [2, p. 2].

In January 1986, AT&T engineers identified "low levels" of chlorinated solvents and petroleum hydrocarbons in water from production wells 1 and 3. Analytical results of groundwater samples using Environmental Protection Agency (EPA) Methods 601, 602, and 624, indicated that production wells 1 and 3 were contaminated with volatile organic compounds (VOCs). Subsequently, Camp, Dresser, and McKee, Inc. (CDM) was hired by AT&T (Former) to investigate the extent of the contamination at the property and to assist in the removal of USTs [2, p. 2].

In a February 1988 Phase II Hydrogeologic Investigation report, CDM identified the following potential sources for groundwater and soil contamination:

- Former solvent tank farm area containing nine USTs were removed from the property between 1986 and 1987 by Chemical Waste Management (CWM); however, there is no available file information on these tank disposals.

- Waste solvent UST was removed from the property in 1986; however, there is no available file information on this tank disposal.

- Waste acetone UST, was cleaned, filled with grout, and abandoned in place in 1987 by CWM.

- Barrel pad area was located approximately 150 feet northwest of Building 51. This area, which consisted of a waste solvent UST and an aboveground barrel storage facility, was removed from the property in 1985; however, there is no available file information on the tank disposals [2, p. 2; 36].

CDM reported that as part of AT&Ts tank decommissioning plan, 17 USTs were decontaminated and then removed and one UST was abandoned in place (with the approval of the North Andover Fire Marshall) [2, p. 3; 29, pp. 1, 6]. Available file information discusses only 11 of the removed USTs and the one abandoned UST, which included a 5,000-gallon gasoline UST, a 7,500-gallon waste acetone UST, waste oil UST, and nine solvent USTs and associated piping in the tank farm area. The nine solvent USTs included the following: 10,000-gallon TCE, 5,000-gallon acetone, 500-gallon acetone, 500-gallon varsol, 1,000-gallon varsol, 1,000-gallon toluene, and three 1,000-gallon methylchloroform [1,1,1-trichloroethane (1,1,1-TCA)] USTs. The waste acetone UST was decontaminated and abandoned in place [29, p. 6]. The waste oil UST was removed in 1986; however, the location and capacity of the waste oil UST was not included in available file information [29, pp. 6-7].

Soils unearthed during the solvent tank farm excavation in 1986 were screened for VOCs. Composite samples from soil piles were analyzed using EPA Method 8240 and soils containing VOCs in concentrations greater than 1 part per million (ppm) were removed off-

site by a licensed hazardous waste hauler to an approved disposal facility. VOCs detected included 1,1,1-TCA, toluene, 1,2-dichloropropane, methylene chloride, and TCE. Of the 570 cubic yards (yd^3) of soil unearthed in the solvent tank farm excavation area, approximately 300 yd^3 were transported off site by Suffolk Services, Inc. to SCA Chemical Services in Model City, New York. The remaining 270 yd^3 was determined by CDM to be "uncontaminated" and returned to the excavation area [2, p. 3; 29, pp. 8-9].

In 1987, CDM installed an air stripper on the property to treat contaminated water encountered during dewatering activities in the solvent tank farm area. Effluent from the air stripper was discharged to the on-site wastewater treatment plant which discharges to the Merrimack River. Groundwater remediation occurred between February 23, 1987 and May 28, 1987. Approximately 50,000 gallons of water were recovered and treated. Prior to discharging, CDM collected influent and effluent samples from the air stripper on a weekly basis. The samples were analyzed for VOCs using EPA Method 624. Results indicated that the concentrations were detected below the limit specified in the NPDES outfall permit. In addition, CDM installed 21 monitoring wells on the property in 1987. Analytical results of groundwater samples from the monitoring wells indicated VOCs were detected in 18 of the 21 wells. The following VOCs were detected toluene, TCE, and 1,1,1-TCA. The concentrations detected ranged from 19 parts per billion (ppb) to 208,706 ppb total VOCs [2, pp. 3-4].

The on-site wastewater treatment plant is required to operate under the regulations of the National Pollutant Discharge Elimination System (NPDES). The joint NPDES permit numbers are: Federal No. MA0001261 and State No. 352 [2, p. 3]. The NPDES permit was originally issued in 1974. The most recent version of the NPDES permit was issued in 1992 [30].

A groundwater remediation program was initiated in November 1990. The remediation system consists of 2 extraction wells (EW-2 and EW-3) pumping groundwater to the air stripper tower which measures 5 ft in diameter and 45 ft in height. The groundwater treatment system is currently in operation and its purpose is to extract and treat VOCs from groundwater at the AT&T (former) property. The off gas from the air stripper tower is treated by passing the stream through a vapor recovery system, consisting of four 1,130 pounds (lbs) vapor phase carbon units [3, p. 1]. The vapor phase carbon units are replaced approximately every 4 months, as necessary, and disposed of off site as hazardous waste by a licensed hazardous waste transporter [10]. Previously, the treated effluent water drained from the air stripper tower by gravity to a 100,000-gallon open-air surge tank connected to a 20,000-gallon underground sump tank. The effluent was fed from the tanks to a deionized water treatment plant on the property for use as process water [3, p. 1]. The water was treated at the water treatment plant which discharged to the Merrimack River in compliance with the NPDES permit [3, p. 1; 4, p. 1]. Currently, the treated effluent water discharges directly to the storm drain [35]. Between November 1990 and December 1998, approximately 500 million gallons of groundwater had been treated. This system removed approximately 3,000 lbs of VOCs, approximately 1800 lbs of which was TCE [1, p. ii].

In December 1992, contamination was noted in a former caustic cleaning room in Building 30 by AT&T employees during excavation activities of the floor slab and shallow soil to install new process equipment. In response to this noted contamination, CDM collected soil samples, soil gas samples, and installed three groundwater monitoring wells (AT&T-1, AT&T-2, and AT&T-3) in the vicinity of the sump in Building 30.[1, pp. iii, 3-1]. Further details regarding groundwater and soil sampling results were not included in available file information. In 1993, CDM conducted the soil gas survey at the building sump area in Building 30. Results indicated that detectable concentrations of TCE (greater than 50 ppb volume (ppbv)) were present at distances 200 ft from the suspected sump source area. Soil gas concentrations of TCE above 25 ppm volume (ppmv) were identified in shallow soils up to 150 ft from the source area [1, pp. 3-23]. In addition, quarterly sampling of the ambient building air was instituted to monitor for VOCs [1, pp. iii, vi, 3-1].

In December 1993, CDM collected groundwater samples from 18 on-site monitoring wells and analyzed the samples for VOCs by EPA Method 8240 [4]. Analytical results indicated seven VOCs were detected in groundwater from shallow and deep wells at concentrations greater than or equal to the background sample's sample reporting limit (SRL) [4]. Refer to the groundwater pathway section of this report for additional details and analytical results.

CDM collected groundwater samples from 19 monitoring wells including production wells PW-1, PW-2, and PW-3 on the AT&T (former) property in December 1995. Samples were analyzed for VOCs by EPA Method 8240 [3]. Analytical results indicated that seven VOCs were detected in groundwater from the on-site wells at concentrations greater than or equal to the reference sample's SRL [4]. Refer to the groundwater pathway section of this report for additional details and analytical results.

In November 1996, CDM installed five additional monitoring wells in three locations to characterize groundwater in the area next to Building 71. Building 71 was constructed over the former tank farm area following the 1986 excavation of VOC contaminated soil. The five wells installed were MW-12S, MW-12D, MW-13S, MW-13D, and MW-14S [1, p. 3-1]. In December 1996, CDM sampled the five monitoring wells. Analytical results of groundwater sampling indicated TCE at concentrations as high as 310,000 ppb. Monitoring wells MW-2S and MW-2D were removed during the construction of the building [1, pp. iii, 3-1]. According to MADEP, groundwater beneath the site is categorized under the Massachusetts Contingency Plan (MCP) as GW-2 due to the relative shallow depth to groundwater and the presence of an occupied building. Substances above GW-2 standard are considered to be a potential source of vapors to indoor air. The GW-2 standard for TCE (in groundwater) is 300 ppb [37].

During June, July, October, and November 1998, Lucent conducted additional subsurface investigations to evaluate the groundwater quality in the area of the former solvent tank farm for extent of TCE contamination at the property [1, p. 3-1]. Seven groundwater monitoring wells (MW-15S, MW-15D, MW-16, MW-17, MW-18, MW-19, and MW-20) were

installed by CDM. September 1998 sampling of these wells revealed TCE at a maximum concentration of 470,000 ppb [1, p. 3-9].

In June 1998, CDM conducted another soil gas survey in the area of the former tank farm. Samples were collected from inside Buildings 30, 70, and 71 and outside in the shipping/receiving courtyard [1, p. 3-23]. Again, soil gas survey results indicated that concentrations of TCE above 50 ppbv were present at distances 200 ft from the suspected source. Soil gas concentrations of TCE above 25 ppmv were found in soils up to 150 ft from the source area [1, p. 3-23].

In November 1998, 10 ground level ambient air samples were collected by CDM from selected locations inside Buildings 30, 70, and 71. Air samples were analyzed for VOCs using EPA Method TO-15. The samples were collected using Summa canisters with a 6 liter capacity and a 24 hour duration [1, p. 3-24]. Analytical results indicated TCE at a concentration of 190 ppbv in one sample from Building 71. CDM reported that this result was a potential health risk if detected in the breathing zone. TCE and tetrachloroethylene (PCE) were detected in other sample locations in Building 30 and Building 70 [1, p. 3-26].

In December 1998, three additional ground level ambient air samples were collected in Building 71 to confirm the November 1998 sample results. Analytical results indicated TCE at a concentration of 810 ppbv in one sample which again could present a risk if in the breathing zone [1, p. 3-26].

Due to these air sample results, Lucent initiated a Release Abatement Measure (RAM) in February 1999 to mitigate infiltration of VOC vapors from the subsurface to the building air. The RAM consisted of sealing all visible cracks in the floor of Buildings 30, 70, and 71. Following the RAM actions, air samples were collected from the breathing zone. According to CDM, no VOCs were detected in the breathing zone at concentrations that pose a significant health risk [1, p. 3-26].

On September 29, 1999, Tetra Tech NUS (TtNUS) team personnel conducted an on-site reconnaissance of the AT&T (former) property. TtNUS team personnel noted the following 10 buildings on the property: the main manufacturing facility (Building 30), power plant (Building 41), garage (Building 40), receiving warehouse (Building 71), shipping warehouse (Building 70), air stripper remediation system (Building 51), deionized water (Building 53), wastewater treatment plant (Building 50), hazardous waste storage area (Building 49), and the former chemical storage area (Building 48). The former chemical storage area (Building 48) was undergoing renovations, and according to Lucent representatives, will be converted to a manufacturing shop [10]. TtNUS team personnel observed four sanitary wastewater treatment sand filter beds, each approximately 30 ft by 60 ft, located north-northwest of Building 50. Lucent representatives informed TtNUS team personnel that the sand filter beds are currently only used in emergency situations [10; 36]. A fifth uncovered sand filter bed, approximately 1,800 square feet (ft^2) and located west of Building 50, was used for industrial wastewater sludge dewatering [10; 36]. The sand filter beds were not overgrown with vegetation [10]. In 2001, the contents of the industrial

sludge dewatering filter sand bed and under drainage system have been removed and disposed of off-site [36].

Approximately twelve 55-gallon drums containing hazardous waste were observed by TtNUS team personnel in Building 49. Lucent representatives informed TtNUS team personnel that the hazardous waste generated at the facility includes rags saturated with isopropanol, solder paste, and waste oils. All hazardous waste drums are shipped off site for disposal by a licensed transporter [10].

TtNUS team personnel observed a 8,000-gallon ferric chloride aboveground storage tank (AST) south of Building 50 and a 6,000-gallon AZ112A stripper with glycol ethers AST (not associated with the air stripper) north of Building 70 [10; 35]. According to Lucent representatives, the AZ112A stripper and the ferric chloride ASTs were decommissioned and cleaned in 2000 and 2001, respectively, and will be scheduled to be removed from the property [10;35; 36]. There were two liquid nitrogen ASTs on the property each approximately 30 ft tall and 10 ft in diameter, which according to Lucent representatives are owned by BOC Gas. The liquid nitrogen tanks are located northwest of Building 30 in a paved area. According to Lucent representatives, there are two USTs currently on the property, one 6,000-gallon gasoline UST and one 2,000-gallon diesel UST. These two USTs are located west of Building 41 [10; 30].

During the on-site reconnaissance, TtNUS team personnel observed an unnamed stream which flows along the southeastern border of the property. This stream is culverted beneath the property, prior to emerging along the southwestern property border. The unnamed culvert stream enters into an offsite unnamed stream and then flows into the Merrimack River [10; 35].

The property is surrounded by a maintained chain-link fence with barbed wire. Three guarded gates provide vehicle and pedestrian access to the property; however, access is restricted to security card holders only. In general, the areas surrounding the buildings are paved and used for parking. There is a grass covered area between the fence and the parking areas on the south, southwestern, and northern portions of the property. The nearest residence is located on Osgood Street approximately 100 ft east of the property. TtNUS team personnel did not observe any stressed vegetation or stained soils on the AT&T (former) property. TtNUS team personnel observed approximately 36 wells throughout the property, including two extraction wells and monitoring wells located inside Buildings 30, 70, and 71. According to Lucent representatives, there are currently 62 monitoring wells on-site [36]. All the wells observed by TtNUS team personnel were capped and appeared to be in good condition. Additionally, there are inactive production wells on the property [10].

On April 11, 2000, TtNUS team personnel collected three soil/source samples from two cells of one on-site industrial wastewater sand filter bed on the property and five sediment samples from the unnamed culverted stream [10]. Source, sediment, and quality assurance/quality control (QA/QC) samples were analyzed for the following parameters:

VOCs, semivolatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs), metals, and cyanide [31; 32].

As directed by EPA, TtNUS performed a Tier I evaluation of the Site Investigation (SI) sample analytical results according to Region I EPA - New England Data Validation Functional Guidelines for Evaluating Environmental Analyses (December 1996). A Tier I evaluation consists of checking for data completeness, (i.e. that the complete set of analytical results and supporting information for all of the samples have been received by TtNUS from the Contract Laboratory Program (CLP) and Delivery of Analytical Services (DAS) laboratories). Under a Tier I data validation, no qualifications are made to the laboratory-reported values to account for field or laboratory QA/QC issues (i.e., holding times, instrument calibrations, blank contamination, matrix spikes, recoveries, etc.). Therefore, detection of chemicals at low concentrations, or at concentrations near the sample quantitation limit, could be considered false positive values due to blank contamination or based on some other criteria identified during a more rigorous Data Validation (i.e. Tier III). In particular, this could be the case for the common laboratory organic compound contaminants: acetone, methylene chloride, 2-butanone, toluene, and phthalates.

Analytical results indicated three VOCs, 18 SVOCs, two pesticides, one PCB, and two inorganics were detected in the sediment samples [31; 32]. Refer to the Surface Water Migration Pathway section for additional information and analytical results.

The following table summarizes soil/source samples collected by TtNUS team personnel from the AT&T (former) property on April 11, 2000.

Sample Summary: AT&T (Former)
Soil/Source Samples Collected by TtNUS Team Personnel on April 11, 2000

Sample Location No.	Traffic Report No.	Time (hours)	Grab/ Comp.	Sample Depth (Inches)	GPS Data (Latitude/ Longitude)	Sample Information
MATRIX: Soil/Source						
18-SO-01 MS/MSD	DO1205	1108	Grab	0 to 24	42° 43′ 53.5″ N 71° 07′ 11.2″ W	Soil/source sample collected from the industrial wastewater sand filter bed west of Building 50. Sample appeared to be tan sand with red/purple sand at ~2 feet; PID = 0.

18-SO-02	DO1206	1120	Grab	0 to 24	42° 43′ 53.5″ N 71° 07′ 11.2″ W	Soil/source sample collected from the industrial wastewater sand filter bed west of Building 50. Sample appeared to be black/dark brown sand (0 to 4 inches) over tan sand; PID = 0.
18-SO-DUP-01	DO1207	1127	Grab	0 to 24	42° 43′ 53.5″ N 71° 07′ 11.2″ W	Duplicate of 18-SO-02, collected for quality control.

MS/MSD = Matrix Spike/Matrix Spike Duplicate
~ = Approximately
PID = Photoionization Detector
GPS = Global Positioning System
Comp. = Composite

[10]

For each sample location, a compound or element is listed if it is detected at a concentration greater than or equal to the SRL. The following table summarizes substances detected through DAS analysis of soil/source samples collected by TtNUS team personnel on April 11, 2000.

Summary of Analytical Results
Soil/Source Sample Analysis for AT&T (Former)
Collected by TtNUS on April 11, 2000

Sample Location	Compound/ Element	Sample Concentration		
18-S0-01 (D01205)	**VOCs**			
	acetone	9	JB	ppb
	2-butanone	3	J	ppb
	SVOCs			
	fluoranthene	63	J	ppb
	pyrene	63	J	ppb
	chrysene	67	J	ppb
	bis(2-ethylhexyl)phthalate	470		ppb
	benzo(b)fluoranthene	55	J	ppb
	PESTICIDEs			
	delta-BHC	4.9		ppb

18-S0-01 (continued)	**INORGANICs**			
	aluminum	1,870		ppm
	arsenic	3.2		ppm
	barium	13.3	B	ppm
	beryllium	0.13	B	ppm
	cadmium	0.23	B	ppm
	calcium	1,150		ppm
	chromium	26.9		ppm
	cobalt	2.9	B	ppm
	copper	342		ppm
	iron	4,910		ppm
	lead	67.1		ppm
	magnesium	610	B	ppm
	manganese	174		ppm
	nickel	18.1		ppm
	potassium	515	B	ppm
	selenium	1.2	N	ppm
	vanadium	12.1		ppm
	zinc	54.3		ppm
	cyanide	1.2		ppm
18-S0-02 (D01206)	**VOCs**			
	acetone	250	EB	ppb
	2-butanone	110		ppb
	benzene	1	J	ppb
	2-hexanone	18		ppb
	SVOCs			
	anthracene	41	J	ppb
	fluoranthene	280	J	ppb
	pyrene	230	J	ppb
	benzo(a)anthracene	160	J	ppb

18-S0-02 (continued)	chrysene	240	J	ppb
	bis(2-ethylhexyl)phthalate	230	J	ppb
	benzo(b)fluoranthene	200	J	ppb
	benzo(k)fluoranthene	88	J	ppb
	benzo(a)pyrene	100	J	ppb
	indeno(1,2,3-cd)pyrene	69	J	ppb
	benzo(g,h,i)perylene	55	J	ppb
	INORGANICs			
	aluminum	2,150		ppm
	arsenic	4.2		ppm
	barium	16.5	B	ppm
	beryllium	0.2	B	ppm
	cadmium	0.18	B	ppm
	calcium	1,720		ppm
	chromium	17.3		ppm
	cobalt	2.5	B	ppm
	copper	412		ppm
	iron	6,480		ppm
	lead	71.9		ppm
	magnesium	718	B	ppm
	manganese	373		ppm
	nickel	27.7		ppm
	potassium	645	B	ppm
	vanadium	18.5		ppm
	zinc	24.7		ppm
	cyanide	0.1	B	ppm
18-S0-DUP-01 (D01207)	**VOCs**			
	acetone	28	B	ppb
	2-butanone	7	J	ppb

18-S0-DUP-01 (D01207) (continued)	**SVOCs**			
	fluoranthene	52	J	ppb
	pyrene	45	J	ppb
	chrysene	37	J	ppb
	bis(2-ethylhexyl)phthalate	1,400		ppb
	benzo(b)fluoranthene	59	J	ppb
	benzaldehyde	44	J	ppb
	dimethylphthalate	200	J	ppb
	PESTICIDEs			
	delta-BHC	4		ppb
	INORGANICs			
	aluminum	2,000		ppm
	arsenic	3.8		ppm
	barium	20.5	B	ppm
	beryllium	0.17	B	ppm
	cadmium	0.22	B	ppm
	calcium	5,880		ppm
	chromium	20.8		ppm
	cobalt	3	B	ppm
	copper	503		ppm
	iron	6,810		ppm
	lead	135		ppm
	magnesium	695	B	ppm
	manganese	645		ppm
	nickel	42.6		ppm
	potassium	625	B	ppm
	vanadium	21		ppm
	zinc	33.8		ppm
	cyanide	0.45		ppm

ppm	=	parts per million
ppb	=	parts per billion
VOCs	=	Volatile Organic Compounds
SVOCs	=	Semivolatile Organic Compounds
J	=	Estimated value below contract required quantitation limit
E	=	Concentration greater than calibration range (organic analysis)
B	=	In laboratory blank (organic analysis)
B	=	Below contract required detection limit (inorganic analysis)
N	=	Spike % R greater than limit

[31; 32]

Analytical results indicated four VOCs, 13 SVOCs, one pesticide, 18 metals and cyanide were detected in soil/source samples [31; 32].

AT&T (former) is the only property in North Andover listed on the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) list [25]. In addition to the property, there are 40 facilities governed by RCRIS [26].

SOURCE EVALUATION

Description of each Source: Identify each source area by name and number, and classify each source into a source type category (see SI Table 1). Describe the dimensions of each source. Identify the hazardous substances associated with each source. Determine the containment characteristics for each source by pathway (see HRS Tables 3-2, 4-2, 6-3 and 6-9).

Source 1. Abandoned Waste Acetone UST (Tank)

A 7,500-gallon waste acetone UST was located along the exterior northwest section of Building 70. This UST was cleaned, filled with grout, and abandoned in place in 1987. This UST has no known secondary containment [2, p. 2; 29, p. 6]. Available file information did not indicate confirmatory soil sampling after the tank closure. This source is available to the groundwater, surface water, soil exposure, and air migration pathways.

Source 2. Former Solvent Tank Farm (Contaminated Soil)

The former solvent tank farm included the following USTs; one 10,000-gallon TCE, one 5,000-gallon acetone, three 1,000-gallon methylchloroform, one 1,000-gallon toluene, one 1,000-gallon varsol, one 500-gallon acetone, and one 500-gallon varsol with associated piping. These USTs which had no known secondary containment were removed in 1986 and 1987. Manifests for the disposal of the USTs were not included in available file information. Soils unearthed during the solvent tank farm excavation were either screened for VOCs or composite samples were collected from soil piles. Soil samples were analyzed using EPA Method 8240 and soils containing VOCs in concentrations greater than 1 ppm were removed off site by a licensed hazardous waste hauler to an approved disposal facility. Of the 570 yd^3 of soil unearthed in the solvent tank farm excavation area, approximately 300 yd^3 were transported off site by Suffolk Services, Inc. to SCA Chemical Services in Model City, New York [2, p. 3; 29, pp. 6-9]. Based on soil gas samples and organic vapor monitor results from CDM's Phase II report, TtNUS team personnel assumes that an area of approximately 80,000 ft^2 of contaminated soil exists in the area of the former tank farm. Since the contamination is covered by a building and pavement, TtNUS team personnel assumes that this source is available to the groundwater, surface water, and air migration pathways.

Source 3. Hazardous Waste Storage Area (Drums)

TtNUS team personnel observed approximately 12 55-gallon drums of hazardous waste in the hazardous waste storage area of Building 49 which has a concrete berm. Lucent representatives informed TtNUS team personnel that the hazardous waste generated at the facility includes rags saturated with isopropanol, solder paste, and waste oils. All hazardous waste drums are shipped off site for disposal by a licensed transporter [10]. This source is available to the groundwater, surface water, soil exposure, and air migration pathways.

Source 4. **Vapor Phase Carbon Units (Other)**

Between November 1990 and December 1998, approximately 500 million gallons of groundwater had been treated by the on-site remediation system. This system removed approximately 3,000 lbs of VOCs of which TCE had accounted for approximately 1,800 lbs [1, p. ii]. The remediation system consists of two extraction wells pumping groundwater to an air stripper tower measuring 5 ft in diameter and 45 ft in height. The off gas from the air stripper tower is treated by passing the stream through a vapor recovery system, consisting of four 1,130 lb vapor phase carbon units [3, p. 1]. The vapor phase carbon units are replaced approximately every 4 months and shipped as hazardous waste off site by a licensed transporter [10]. This source is available to the groundwater, surface water, soil exposure, and air migration pathways.

Source 5. **Former Sand Filter Beds (Surface Impoundment)**

TtNUS team personnel observed four sanitary wastewater treatment sand filter beds located north-northwest of Building 50 and one industrial waste water sand filter bed located west of building 50. The five beds are approximately 30 ft by 60 ft. Lucent representatives informed TtNUS team personnel that the sand filter beds are currently only used for wastewater filtration in emergency situations [10]. There is no cover above the five sand filter beds; however, there is the collection system underneath the sand filter beds. This collection system connects to the wastewater treatment plant [10]. The waste water plant, which treats sanitary waste, is scheduled to be closed down [10; 35]. The contents of the industrial sludge dewatering filter sand bed and under drainage system have been removed and disposed of off-site [36]. For the purposes of this report, TtNUS team personnel assumes that this source is available to the groundwater, surface water, soil exposure, and air migration pathways.

Source 6. **Contaminated Soil (Contaminated Soil)**

In 1993, soil gas samples were collected in the caustic cleaning room area in Building 30. Results indicate that detectable concentrations of TCE above 50 ppbv were present at distances 200 ft from the suspected source. Soil gas concentrations of TCE above 25 ppmv were detected in soils up to 150 ft from the source area [1, p. 3-23]. Additionally, three monitoring wells were installed in Building 30. VOC contamination was detected in groundwater samples collected from the wells. Based on this, TtNUS team personnel has calculated and assumes that an area of approximately 50,000 ft^2 of contaminated soil exists in the caustic cleaning room area. The contamination is covered by a building and pavement. TtNUS team personnel assumes that this source is available to the groundwater, surface water, and air migration pathways.

Source 7. **Surge Tank (Tank)**

Treated effluent water had drained from the air stripper tower by gravity to a 100,000-gallon open-air surge tank [3, p. 1; 35]. The open-air surge tank is below ground level; however, at ground level it is open to the atmosphere. This tank is abandoned in place [35]. This source is available to the groundwater, surface water, soil exposure, and air migration pathways.

Source 8. **Underground Sump Tank (Tank)**

The 100,000-gallon surge tank was connected to a 20,000-gallon underground sump tank [3, p. 1; 35]. This source is available to the groundwater, surface water, soil exposure, and air migration pathways.

Source 9. **Former Ferric Chloride AST (Tank)**

TtNUS team personnel observed a 8,000-gallon ferric chloride AST south of Building 50 [10]. According to Lucent representatives, the AST was decomissioned and cleaned and will be scheduled to be removed from the property [36]. This source is available to the groundwater, surface water, soil exposure, and air migration pathways.

Source 10. **Former AZ112A Stripper AST (Tank)**

TtNUS team personnel observed a 6,000-gallon AZ112A stripper with glycol ethers AST along the exterior north side of Building 70. According to Lucent representatives, the AST was decommissioned and cleaned and will be scheduled to be removed from the property. This AST had double-walled containment system with a leak detection system [10; 35; 36]. This source is available to the groundwater, surface water, soil exposure, and air migration pathways.

Source 11. **Liquid Nitrogen ASTs (Tanks)**

TtNUS team personnel observed two liquid nitrogen ASTs located north of Building 30. According to Lucent representatives, the ASTs are owned by BOC Gas. Each of the liquid nitrogen ASTs are approximately 30 ft tall and 10 ft in diameter. These ASTs have no known secondary containment [10]. This source will not be evaluated further.

Source 12. **Former Gasoline UST (Tank)**

A 5,000-gallon gasoline UST located southwest of Building 41 was removed from the property in 1986 [10; 29, p. 4; 30]. The gasoline UST is included in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) petroleum exclusion rule, and therefore will not be evaluated further.

Source 13. Gasoline and Diesel USTs (Tanks)

According to Lucent representatives, there are two USTs currently on the property. One 6,000-gallon gasoline UST and one 2,000-gallon diesel UST are located west of Building 41 in the same location as the former 5,000-gallon gasoline tank [29, p. 4]. These USTs are included in the CERCLA petroleum exclusion rule, and therefore will not be evaluated further.

Source 14. Former Waste Oil UST (Tank)

A waste oil UST was removed from the property in 1986. The location and capacity of the UST were not included in available file information. Manifests for the disposal of the UST were not included in available file information [29, p. 6]. Due to a lack of available file information, this source will not be evaluated further.

Source 15. Former Waste Solvent USTs (Tanks)

One waste solvent UST was removed from the property in 1986 [2, p. 2]. Further information regarding this USTs was not included in available file information. Manifests for the disposal of the UST was not included in available file information. Due to a lack of available file information, this source will not be evaluated further.

Source 16. Former Barrel Pad Area (Other)

The barrel pad area was located approximately 150 feet northwest of Building 51. This area consisted of a waste solvent UST and an aboveground barrel storage facility. This facility was removed in 1985 [2, p. 2; 36]. No further information regarding this source was included in available file information; therefore, this source will not be evaluated further.

Source 17. Former USTs (Tanks)

Reportedly, 17 USTs were removed from the AT&T (former) property in 1986; however, available file information discusses only 11 of these USTs [2, p. 3]. These 11 USTs have been evaluated under different source names. Due to lack of available file information, the remaining six USTs will not be evaluated further.

Source 18. On-site Wastewater Treatment Plant (Other)

The on-site wastewater treatment plant receives wastewater from the Lucent plant and effluent from the air stripper [2, p. 3]. Components of the wastewater treatment plant include sand filter beds and a 8,000-gallon ferric chloride AST, which have been evaluated under different source names [10]. Further information regarding this source was not included in available file information; therefore, this source will not be evaluated further.

Source 19. Former Chemical Storage Area (Other)

Building 48 was the former chemical storage area. At the time of the on-site reconnaissance, Building 48 was under renovations and according to Lucent representatives will be converted to a manufacturing shop [10]. Available file information and TtNUS team on-site reconnaissance did not reveal any incidents of spills or contamination in this area; therefore, this source will not be evaluated further.

The following table is a list of sources, source types, and pathway availability.

Source No.	Source Type	Pathway Availability			
		GW	SW	SE	A
1	Tank	Y	Y	Y	Y
2	Contaminated Soil	Y	Y	N	Y
3	Drums	Y	Y	Y	Y
4	Other	Y	Y	Y	Y
5	Surface Impoundment	Y	Y	Y	Y
6	Contaminated Soil	Y	Y	N	Y
7	Tank	Y	Y	Y	Y
8	Tank	Y	Y	Y	Y
9	Tank	Y	Y	Y	Y
10	Tank	Y	Y	Y	Y
11	Tanks	N	N	N	N
12	Tank	I	I	I	I
13	Tanks	I	I	I	I
14	Tank	N	N	N	N
15	Tank	N	N	N	N
16	Other	N	N	N	N
17	Tanks	N	N	N	N
18	Other	N	N	N	N
19	Other	N	N	N	N

Legend:
Y = available to pathway
N = not available to pathway
? = availability unknown
I = ineligible waste

Hazardous Waste Quantity (HWQ) Calculations: SI Tables 1 and 2 (See HRS Tables 2-5, 2-6, and 5-2).

For each source, provide HWQ calculations by tier and provide assumptions. Note: HWQ calculations may be different for the soil exposure pathway.

There is insufficient information to evaluate the sources on *Tier A (Hazardous Constituent Quantity)* or *Tier B (Hazardous Wastestream Quantity)*.

Source 1. Abandoned Waste Acetone UST (Tank)

Tier C (Volume)

A 7,500-gallon waste acetone UST was abandoned in place in 1987. For multiple source sites, the volume of a tank, in gallons, is divided by 500 to determine the source Waste Quantity (WQ) value.

7,500 gallons ÷ 500 = 15

Tier D (Area)

The "tank" source cannot be evaluated on Tier D.

Source 1 WQ = 15

Source 2. Former Solvent Tank Farm (Contaminated Soil)

Tier C (Volume)

There is insufficient information to evaluate the source on Tier C.

Tier D (Area)

Approximately 80,000 ft^2 of contaminated soil exists in the area of the former tank farm. For multiple source sites, the area of contaminated soil, in ft^2, is divided by 34,000 to determine the source WQ value.

80,000 ft^2 ÷ 34,000 = 2.35

Source 2 WQ = 2.35

Source 3. Hazardous Waste Drums (Drums)

Tier C (Volume)

Approximately 12 55-gallon drums of hazardous waste were in Building 49. For multiple source sites, the number of drums is divided by 10 to determine the source WQ value.

12 ÷ 10 = 1.2

Tier D (Area)

The "drum" source cannot be evaluated on Tier D.

Source 3 WQ = 1.2

Source 4. Vapor Phase Carbon Units (Other)

Tier C (Volume)

The vapor recovery system uses four 1,130 lb vapor phase carbon units. For the purposes of this evaluation, TtNUS team assumes that 1,130 lbs is the weight of the carbon filter and will use this measurement to evaluate the WQ value. For multiple source sites, the volume of an "other" source, in yd^3, is divided by 2.5 to determine the source WQ value.
2,000 lbs = 1 yd^3
4,520 lbs ÷ 2,000 lbs = 2.26 yd^3
2.26 yd^3 ÷ 2.5 = 0.9

Tier D (Area)

The "other" source cannot be evaluated on Tier D.

Source 4 WQ = 0.9

Source 5. Former Sand Filter Beds (Surface Impoundment)

Tier C (Volume)

There is insufficient information to evaluate the source on Tier C.

Tier D (Area)

There are five sand filter beds that are approximately 30 ft by 60 ft. For multiple source sites, the area of a surface impoundment, in ft^2, is divided by 13 to determine the source WQ value.

30 ft x 60 ft x 5 beds = 9,000 ft^2
9,000 ft^2 ÷ 13 = 692.31

Source 5 WQ = 692.31

Source 6. Contaminated Soil (Contaminated Soil)

Tier C (Volume)

There is insufficient information to evaluate this source on Tier C.

Tier D (Area)

Approximately 50,000 ft^2 of contaminated soil exists in the caustic cleaning room area. For multiple source sites, the area of contaminated soil, in ft^2, is divided by 34,000 to determine the source WQ value.

50,000 ft^2 ÷ 34,000 = 1.47

Source 6 WQ = 1.47

Source 7. Surge Tank (Tank)

Tier C (Volume)

Treated effluent water had drained from the air stripper tower by gravity to a 100,000-gallon surge tank. This tank was abandoned in place. For multiple source sites, the volume of a tank, in gallons, is divided by 500 to determine the source WQ value.

100,000 gallons ÷ 500 = 200

Tier D (Area)

The "tank" source cannot be evaluated on Tier D.

Source 7 WQ = 200

Source 8. Underground Sump Tank (Tank)

Tier C (Volume)

Treated effluent water had drained from the air stripper tower by gravity to a surge tank which was connected to a 20,000-gallon underground sump tank. For multiple source sites, the volume of a tank, in gallons, is divided by 500 to determine the source WQ value.

20,000 gallons ÷ 500 = 40

Tier D (Area)

The "tank" source cannot be evaluated on Tier D.

Source 8 WQ = 40

Source 9. Former Ferric Chloride AST (Tank)

Tier C (Volume)

A 8,000-gallon ferric chloride AST has been decommissioned. For multiple source sites, the volume of a tank, in gallons, is divided by 500 to determine the source WQ value.

8,000 gallons ÷ 500 = 16

Tier D (Area)

The "tank" source cannot be evaluated on Tier D.

Source 9 WQ = 16

Source 10. Former AZ112A Stripper AST (Tank)

Tier C (Volume)

A 6,000-gallon AZ112A stripper AST has been decommissioned. For multiple source sites, the volume of a tank, in gallons, is divided by 500 to determine the source WQ value.

6,000 gallons ÷ 500 = 12

Tier D (Area)

The "tank" source cannot be evaluated on Tier D.

Source 10 WQ = 12

Based on the WQ values for source nos. 1 to 10, the site WQ value for the Groundwater pathway is: 15 + 2.35 + 1.2 + 0.9 + 692.31 + 1.47 + 200 +40 + 16 + 12 = 981.23. From SI Table 2, a site WQ total score of > 100 to 10,000 is assigned a Hazardous Waste Quantity (HWQ) score of 100.

Based on the WQ values for source nos. 1 to 10, the site WQ value for the Surface Water pathway is: 15 + 2.35 + 1.2 + 0.9 + 692.31 + 1.47 + 200 +40 + 16 + 12 = 981.23. From SI Table 2, a site WQ total score of > 100 to 10,000 is assigned a HWQ score of 100.

Based on the WQ values for source nos. 1, 3-5, and 7-10, the site WQ value for the Soil Exposure pathway is: 15 + 1.2 + 0.9 + 692.31 + 200 +40 +16 + 12 = 977.41. From SI Table 2, a site WQ total score of > 100 to 10,000 is assigned a HWQ score of 100.

Based on the WQ values for source nos. 1 to 10, the site WQ value for the Air Migration pathway is: 15 + 2.3.5 + 1.2 + 0.9 + 692.31 + 1.47 + 200 +40 +16 + 12 = 981.23. From SI Table 2, a site WQ total score of > 100 to 10,000 is assigned a HWQ score of 100.

GW HWQ = 100
SW HWQ = 100
SE HWQ = 100
AIR HWQ = 100

SI TABLE 1:HAZARDOUS WASTE QUANTITY (HWQ) SCORES FOR SINGLE SOURCE SITES AND FORMULAS FOR MULTIPLE SOURCE SITES

		Single Source Sites (assigned HWQ scores)				Multiple Source Sites
Tier	**Source Type**	**HWQ = 10**	**HWQ = 100**	**HWQ = 10,000**	**HWQ = 1,000,000**	**Divisors for Assigning Source WQ Values**
A Hazardous Constituent Quantity	N/A	HWQ = 1 if Hazardous Constituent Quantity data are complete HWQ = 10 if Hazardous Constituent Quantity data are not complete	>100 to 10,000 lbs	>10,000 to 1 million lbs	> 1 million lbs	lbs ÷ 1
B Hazardous Wastestream Quantity	N/A	≤500,000 lbs	>500,000 to 50 million lbs	>50 million to 5 billion lbs	>5 billion lbs	lbs ÷ 5,000
C Volume	Landfill	≤6.75 million ft^3 ≤250,000 yd^3	>6.75 million to 675 million ft^3 >250,000 to 25 million yd^3	>675 million to 67.5 billion ft^3 >25 million to 2.5 billion yd^3	>67.5 billion ft^3 >2.5 billion yd^3	ft^3 ÷ 67,500 yd^3 ÷ 2,500
	Surface impoundment	≤6,750 ft^3 ≤250 yd^3	>6,750 to 675,000 ft^3 >250 to 25,000 yd^3	>675,000 to 67.5 million ft^3 >25,000 to 2.5 million yd^3	>67.5 million ft^3 >2.5 million yd^3	ft^3 ÷ 67.5 yd^3 ÷ 2.5
	Drums	≤1,000 drums	>1,000 to 100,000 drums	>100,000 to 10 million drums	>10 million drums	drums ÷ 10
	Tanks and non-drum containers	≤50,000 gallons	>50,000 to 5 million gallons	>5 million to 500 million gallons	>500 million gals.	gallons ÷ 500
	Contaminated soil	≤6.75 million ft^3 ≤250,000 yd^3	>6.75 million to 675 million ft^3 >250,000 to 25 million yd^3	>675 million to 67.5 billion ft^3 >25 million to 2.5 billion yd^3	>67.5 billion ft^3 >2.5 billion yd^3	ft^3 ÷ 67,500 yd^3 ÷ 2,500
	Pile	≤6,750 ft^3 ≤250 yd^3	>6,750 to 675,000 ft^3 >250 to 25,000 yd^3	>675,000 to 67.5 million ft^3 >25,000 to 2.5 million yd^3	>67.5 million ft^3 >2.5 million yd^3	ft^3 ÷ 67.5 yd^3 ÷ 2.5
	Other	≤6,750 ft^3 ≤250 yd^3	>6,750 to 675,000 ft^3 >250 to 25,000 yd^3	>675,000 to 67.5 million ft^3 >25,000 to 2.5 million yd^3	>67.5 million ft^3 >2.5 million yd^3	ft^3 ÷ 67.5 yd^3 ÷ 2.5

SI TABLE 1:HAZARDOUS WASTE QUANTITY (HWQ) SCORES FOR SINGLE SOURCE SITES AND FORMULAS FOR MULTIPLE SOURCE SITES

		Single Source Sites (assigned HWQ scores)				Multiple Source Sites
Tier	Source Type	HWQ = 10	HWQ = 100	HWQ = 10,000	HWQ = 1,000,000	Divisors for Assigning Source WQ Values
D Area	Landfill	≤340,000 ft^2 ≤7.8 acres	>340,000 to 34 million ft^2 >7.8 to 780 acres	>34 million to 3.4 bil. ft^2 >780 to 78,000 acres	>3.4 billion ft^2 >78,000 acres	ft^2 ÷ 3,400 acres ÷ 0.078
	Surface Impoundment	≤1,300 ft^2 ≤0.029 acres	>1,300 to 130,000 ft^2 >0.029 to 2.9 acres	>130,000 to 13 million ft^2 >2.9 to 290 acres	>13 million ft^2 >290 acres	ft^2 ÷ 13 acres ÷ 0.00029
	Contaminated Soil	≤3.4 million ft^2 ≤78 acres	>3.4 million to 340 million ft^2 >78 to 7,800 acres	>340 million to 34 bil. ft^2 >7,800 to 780,000 acres	>34 billion ft^2 >780,000 acres	ft^2 ÷ 34,000 acres ÷ 0.78
	Pile	≤1,300 ft^2 ≤0.029 acres	>1,300 to 130,000 ft^2 >0.029 to 2.9 acres	>130,000 to 13 million ft^2 >2.9 to 290 acres	>13 million ft^2 >290 acres	ft^2 ÷ 13 acres ÷ 0.00029
	Land treatment	≤27,000 ft^2 ≤0.62 acres	>27,000 to 2.7 million ft^2 >0.62 to 62 acres	>2.7 mil. to 270 million ft^2 >62 to 6,200 acres	>270 million ft^2 >6,200 acres	ft^2 ÷ 270 acres ÷ 0.0062

1 ton = 2,000 lbs = 1 yd^3 = 4 drums = 200 gallons

SI TABLE 2: HWQ SCORES FOR MULTIPLE SOURCE SITES

Site WQ Total	HWQ Score
0	0
1[a] to 100	1[b]
>100 to 10,000	100
>10,000 to 1,000,000	10,000
>1,000,000	1,000,000

[a] If the HWQ total is between 0 and 1, round it to 1.
[b] If the hazardous constituent quantity data are not complete, assign the score of 10.

SI TABLE 3: WASTE CHARACTERIZATION WORKSHEET

Sources: 1. Tank
2. Contaminated Soil
3. Drums
4. Other
5. Surface Impoundment
6. Contaminated Soil
7. Surface Impoundment
8. Tank
9. Tank
10. Tank

Enter "NA" for substances not available to a pathway.
Enter "NL" for substances not listed in SCDM.
Enter "<>" for values not calculated due to "NL".
Footnote substances not used for scoring purposes.

			GROUNDWATER PATHWAY		SURFACE WATER PATHWAY OVERLAND / FLOOD MIGRATION							
Source	Hazardous Substance	Toxicity	GW Mobility HRST 3-8	Tox. x Mob. HRST 3-9	Persistence HRST 4-10/11	Tox. x Pers. HRST 4-12	[BCF] Bioacc. Pot. HRST 4-15	Tox. x Pers. x Bioacc. Pot. HRST 4-16	Ecotox. HRST 4-19	Ecotox. x Pers. HRST 4-20	Eco. Bioacc. Pot. HRST 4-20	Ecotox. x Pers. x Eco. Bioacc. Pot HRST 4-21
1-10	Acetone	1E+01	1E+00	1E+01	4E-01	4E+00	5E-01	2E+00	1E+02	4E+01	5E-01	2E+01
1-10	Aluminum	NL	1E-04	<>	1E+00	<>	5E+01	<>	1E+02	1E+02	5E+01	5E+03
1-10	Ammonia*	1E+02	1E+00	1E+02	7E-04	7E-02	5E-01	0.035	1E+02	7E-02	5E-01	0.035
SW	Aroclor-1254 (PCBs)	1E+04	1E-04	1E+00	1E+00	1E+04	5E+04	5E+08	1E+04	1E+04	5E+04	5E+08
1-10	Anthracene	1E+01	1E-02	1E-01	1E+00	1E+01	5E+03	5E+04	1E+04	1E+04	5E+03	5E+07
1-10	Arsenic	1E+04	1E-02	1E+02	1E+00	1E+04	5E+02	5E+06	1E+01	1E+01	5E+00	5E+01
1-10	Barium	1E+04	1E-02	1E+02	1E+00	1E+04	5E-01	5E+03	1E+00	1E+00	5E-01	5E-01
1-10	Benzaldehyde	NL	NL	<>	NL	<>	NL	<>	NL	<>	NL	<>
1-10	Benzene	1E+02	1E+00	1E+02	4E-01	4E+01	5E+02	2E+04	1E+02	4E+01	5E+03	2E+05
1-10	Benzo(a)anthracene	1E+03	1E-02	1E+01	1E+00	1E+03	5E+04	5E+07	1E+04	1E+04	5E+04	5E+08
1-10	Benzo(a)pyrene	1E+04	1E-04	1E+00	1E+00	1E+04	5E+04	5E+08	1E+04	1E+04	5E+04	5E+08
1-10	Benzo(b)fluoranthene	1E+03	1E-04	1E-01	1E+00	1E+03	5E+04	5E+07	NL	<>	5E+04	<>
1-10	Benzo(g,h,i)perylene	NL	1E-04	<>	1E+00	<>	5E+04	<>	NL	<>	5E+04	<>
1-10	Benzo(k)fluoranthene	1E+02	1E-04	1E-02	1E+00	1E+02	5E+04	5E+06	NL	<>	5E+04	<>
1-10	Beryllium	1E+04	1E-02	1E+02	1E+00	1E+04	5E+01	5E+05	NL	<>	5E+01	<>
1-10	Bis(2-EH)phthalate	1E+02	1E-04	1E-02	1E+00	1E+02	5E+04	5E+06	1E+03	1E+03	5E+04	5E+07
1-10	2-Butanone	1E+01	1E+00	1E+01	4E-01	4E+00	5E-01	2E+00	1E+00	4E-01	5E-01	2E-01
SW	Butylbenzylphthalate	1E+01	2E-01	2E+00	1E+00	1E+01	5E+02	5E+03	1E+02	1E+02	5E+02	5E+04
1-10	Cadmium	1E+04	1E-02	1E+02	1E+00	1E+04	5E+03	5E+07	1E+03	1E+03	5E+03	5E+06
1-10	Calcium	NL	1E+00	<>	1E+00	<>	5E+02	<>	NL	<>	5E+02	<>
SW	Carbazole	1E+01	1E+00	1E+01	4E-01	4E+00	5E+02	2E+03	NL	<>	5E+02	<>
1-10	Chromium	1E+04	1E-02	1E+02	1E+00	1E+04	5E+00	5E+04	1E+02	1E+02	5E+00	5E+02
1-10	Chrysene	1E+01	1E-02	1E-01	1E+00	1E+01	5E+03	5E+04	1E+03	1E+03	5E+02	5E+05
1-10	Cobalt	1E+00	1E-02	1E-02	1E+00	1E+00	5E+03	5E+03	NL	<>	5E-01	<>
1-10	Copper	NL	1E-02	<>	1E+00	<>	5E+04	<>	1E+02	1E+02	5E+04	5E+06
1-10	Cyanide	1E+02	1E+00	1E+02	4E-01	4E+01	5E-01	2E+01	1E+03	4E+02	5E-01	2E+02
1-10	delta-BHC	1E+00	1E+00	1E+00	1E+00	1E+00	5E+02	5E+02	NL	<>	5E+02	<>
SW	Dibenzo(a,h)anthracene	1E+04	1E-04	1E+00	1E+00	1E+04	5E+04	5E+08	NL	<>	5E+04	<>
1-10	Dichloroethane, 1,1-	1E+01	1E+00	1E+01	4E-01	4E+00	5E+00	2E+01	NL	<>	5E+00	<>
1-10	Dichloroethane, 1,2-	1E+02	1E+00	1E+02	4E-01	4E+01	5E+00	2E+02	1E+00	4E-01	5E+00	2E+00
1-10	Dichloroethene, 1,1-	1E+02	1E+00	1E+02	4E-01	4E+01	5E+01	2E+03	1E+01	4E+00	5E+01	2E+02

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Enter "<>" for values not calculated due to "NL".
Footnote substances not used for scoring purposes.

			GROUNDWATER PATHWAY		SURFACE WATER PATHWAY OVERLAND / FLOOD MIGRATION							
Source	Hazardous Substance	Toxicity	GW Mobility HRST 3-8	Tox. x Mob. HRST 3-9	Persistence HRST 4-10/11	Tox. x Pers. HRST 4-12	[BCF] Bioacc. Pot. HRST 4-15	Tox. x Pers. x Bioacc. Pot. HRST 4-16	Ecotox. HRST 4-19	Ecotox. x Pers. HRST 4-20	Eco. Bioacc. Pot. HRST 4-20	Ecotox. x Pers. x Eco. Bioacc. Pot HRST 4-21
1-10	Dichloroethene, cis-1,2-	1E+02	1E+00	1E+02	4E-01	4E+01	5E+00	2E+02	NL	<>	5E+00	<>
1-10	Dichloroethene, trans-1,2-	1E+02	1E+00	1E+02	4E-01	4E+01	5E+01	2E+03	1E+00	4E-01	5E+01	2E+01
1-10	Dimethylphthalate	1E+01	1E+00	1E+01	1E+00	1E+01	5E+01	5E+02	1E+01	1E+01	5E+01	5E+02
SW	di-n-Octylphthalate	1E+02	1E-04	1E-02	1E+00	1E+02	5E+02	5E+04	NL	<>	5E+02	<>
SW	Endrin Ketone	1E+02	NL	<>	4E-01	4E+01	5E-01	2E+01	NL	<>	5E-01	<>
1-10	Fluoranthene	1E+02	1E-02	1E+00	1E+00	1E+02	5E+02	5E+04	1E+04	1E+04	5E+03	5E+07
SW	Fluorene	1E+02	1E-02	1E+00	1E+00	1E+02	5E+03	5E+05	1E+03	1E+03	5E+03	5E+06
SW	gamma-Chlordane	1E+01	1E-02	1E-01	1E+00	1E+01	5E+02	5E+03	1E+04	1E+04	5E+04	5E+08
1-10	2-Hexanone	1E+00	1E+00	1E+00	4E-01	4E-01	5E+00	2E+00	1E+00	4E-01	5E+00	2E+00
1-10	Indeno(1,2,3-cd)pyrene	1E+03	1E-04	1E-01	1E+00	1E+03	5E+04	5E+07	NL	<>	5E+04	<>
1-10	Iron	1E+00	1E-02	1E-02	1E+00	1E+00	5E-01	5E-01	1E+01	1E+01	5E-01	5E+00
1-10	Lead	1E+04	1E-02	1E+02	1E+00	1E+04	5E+03	5E+07	1E+03	1E+03	5E+01	5E+04
1-10	Magnesium	NL	1E+00	<>	1E+00	<>	5E-01	<>	NL	<>	5E-01	<>
1-10	Manganese	1E+04	1E-02	1E+02	1E+00	1E+04	5E+04	5E+08	NL	<>	5E-01	<>
SW	4-Methyl-2-Pentanone	1E+02	1E+00	1E+02	4E-01	4E+01	5E+00	2E+02	1E+00	4E-01	5E+00	2E+00
1-10	Nickel	1E+04	1E-02	1E+02	1E+00	1E+04.	5E+02	5E+06	1E+01	1E+01	5E-01	5E+00
SW	Phenanthrene	NL	1E-02	<>	1E+00	<>	5E+03	<>	1E+03	1E+03	5E+01	5E+04
1-10	Potassium	NL	1E+00	<>	1E+00	<>	5E-01	<>	NL	<>	5E-01	<>
1-10	Pyrene	1E+02	1E-02	1E+00	1E+00	1E+02	5E+01	5E+03	1E+04	1E+04	5E+01	5E+05
1-10	Selenium	1E+02	1E-02	1E+00	1E+00	1E+02	5E+03	5E+05	1E+03	1E+03	5E+03	5E+06
1-10	Tetrachloroethene	1E+02	1E+00	1E+02	4E-01	4E+01	5E+01	2E+03	1E+02	4E+01	5E+01	2E+03
1-10	Toluene	1E+01	1E+00	1E+01	4E-01	4E+00	5E+01	2E+02	1E+02	4E+01	5E+01	2E+03
1-10	Trichloroethane, 1,1,1-	1E+00	1E+00	1E+00	4E-01	4E-01	5E+00	2E+00	1E+01	4E+00	5E+00	2E+01
1-10	Trichloroethylene	1E+01	1E+00	1E+01	4E-01	4E+00	5E+01	2E+02	1E+02	4E+01	5E+01	2E+03
1-10	Vanadium	1E+02	1E-02	1E+00	1E+00	1E+02	5E-01	5E+01	NL	<>	5E-01	<>
1-10	Vinyl Chloride	1E+04	1E+00	1E+04	7E-04	7E+00	5E+00	35	NL	<>	5E-01	<>
1-10	Zinc	1E+01	1E-02	1E-01	1E+00	1E+01	5E+02	5E+03	1E+01	1E+01	5E+02	5E+03

HRST = Hazard Ranking System Table; SCDM Version JUN96

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Footnote substances not used for scoring purposes.

			GROUNDWATER PATHWAY		SURFACE WATER PATHWAY: OVERLAND / FLOOD MIGRATION							
Source	Hazardous Substance	Toxicity	GW Mobility HRST 3-8	Tox. x Mob. HRST 3-9	Persistence HRST 4-10/11	Tox. x Pers. HRST 4-12	[BCF] Bioacc. Pot. HRST 4-15	Tox. x Pers. x Bioacc. Pot. HRST 4-16	Ecotox. HRST 4-19	Ecotox. x Pers. HRST 4-20	Eco. Bioacc. Pot. HRST 4-20	Ecotox. x Pers. x Eco. Bioacc. Pot HRST 4-21

NOTES: Liquid-phase waste disposed of in non-karst terrane, fresh water river environment values. Particulate Mobility Factor Value based on HRS Figure 6-3.
* This substance was noted as being historically used on the property. SW = substances found in on-site sediment samples only.
The following substances have been noted as being historically used on the property; however, they are not SCDM substances: brulin and isopropanol.
Trichloroethane, 1,1,1- = Methylchloroform

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Footnote substances not used for scoring purposes.

			SURFACE WATER PATHWAY						
			GROUNDWATER TO SURFACE WATER				AIR		
Source	Hazardous Substance	Toxicity	Tox. x Mob. x Pers. HRST 4-26	Tox. x Mob. x Pers. x Bioacc Pot. HRST 4-28	Ecotox. x Mob. x Pers. HRST 4-29	Ecotox. x Mob. x Pers. x Eco. Bioacc. HRST 4-29	Gaseous/ Particulate HRST 6-13	Mobility HRST 6-11/12	Tox. x Mob. HRST 6-13
1-10	Acetone	1E+01	4E+00	2E+00	4E+01	2E+01	G	1E+00	1E+01
1-10	Aluminum	NL	<>	<>	1E-02	5E-01	P	8E-05	<>
1-10	Ammonia*	1E+02	7E-02	0.035	7E-02	4E-02	G	1E+00	1E+02
SW	Aroclor-1254 (PCBs)	1E+04	1E+00	5E+04	1E+00	5E+04	GP	2E-02	2E+02
1-10	Anthracene	1E+01	1E-01	5E+02	1E+02	5E+05	GP	2E-03	2E-02
1-10	Arsenic	1E+04	1E+02	5E+04	1E-01	5E-01	P	8E-05	8E-01
1-10	Barium	1E+04	1E+02	5E+01	1E-02	5E-03	P	8E-05	8E-01
1-10	Benzaldehyde	NL	<>	<>	<>	<>	NL	NL	<>
1-10	Benzene	1E+02	4E+01	2E+04	4E+01	2E+05	G	1E+00	1E+02
1-10	Benzo(a)anthracene	1E+03	1E+01	5E+05	1E+02	5E+06	GP	2E-03	2E+00
1-10	Benzo(a)pyrene	1E+04	1E+00	5E+04	1E+00	5E+04	GP	2E-04	2E+00
1-10	Benzo(b)fluoranthene	1E+03	1E-01	5E+03	<>	<>	GP	2E-03	2E+00
1-10	Benzo(g,h,i)perylene	NL	<>	<>	<>	<>	P	8E-05	<>
1-10	Benzo(k)fluoranthene	1E+02	1E-02	5E+02	<>	<>	GP	2E-04	2E-02
1-10	Beryllium	1E+04	1E+02	5E+03	<>	<>	P	8E-05	8E-01
1-10	Bis(2-EH)phthalate	1E+02	1E-02	5E+02	1E-01	5E+03	GP	2E-03	2E-01
1-10	2-Butanone	1E+01	4E+00	2E+00	4E-01	2E-01	G	1E+00	1E+01
SW	Butlylbenzylphthalate	1E+01	2E+00	1E+03	2E+01	1E+04	GP	2E-03	2E-02
1-10	Cadmium	1E+04	1E+02	5E+05	1E+01	5E+04	P	8E-05	8E-01
1-10	Calcium	NL	<>	<>	<>	<>	P	8E-05	<>
SW	Carbazole	1E+01	4E+00	2E+03	<>	<>	GP	2E-03	2E-02
1-10	Chromium	1E+04	1E+02	5E+02	1E+00	5E+00	P	8E-05	8E-01
1-10	Chrysene	1E+01	1E-01	5E+02	1E+01	5E+03	GP	2E-04	2E-03
1-10	Cobalt	1E+00	1E-02	5E+01	<>	<>	P	8E-05	8E-05
1-10	Copper	NL	<>	<>	1E+00	5E+04	P	8E-05	<>
1-10	Cyanide	1E+02	4E+01	2E+01	4E+02	2E+02	P	8E-05	8E-03
1-10	delta-BHC	1E+00	1E+00	5E+02	<>	<>	GP	2E-02	2E-02
SW	Dibenzo(a,h)anthracene	1E+04	1E+00	5E+04	<>	<>	P	8E-05	8E-01
1-10	Dichloroethane, 1,1-	1E+01	4E+00	2E+01	<>	<>	G	1E+00	1E+01
1-10	Dichloroethane, 1,2-	1E+02	4E+01	2E+02	4E-01	2E+00	G	1E+00	1E+02
1-10	Dichloroethene, 1,1-	1E+02	4E+01	2E+03	4E+00	2E+02	G	1E+00	1E+02

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Footnote substances not used for scoring purposes.

			SURFACE WATER PATHWAY						
			GROUNDWATER TO SURFACE WATER				AIR		
Source	Hazardous Substance	Toxicity	Tox. x Mob. x Pers. HRST 4-26	Tox. x Mob. x Pers. x Bioacc Pot. HRST 4-28	Ecotox. x Mob. x Pers. HRST 4-29	Ecotox. x Mob. x Pers. x Eco. Bioacc. HRST 4-29	Gaseous/ Particulate HRST 6-13	Mobility HRST 6-11/12	Tox. x Mob. HRST 6-13
1-10	Dichloroethene, cis-1,2-	1E+02	4E+01	2E+02	<>	<>	G	1E+00	1E+02
1-10	Dichloroethene, trans-1,2-	1E+02	4E+01	2E+03	4E-01	2E+01	G	1E+00	1E+02
1-10	Dimethylphthalate	1E+01	1E+01	5E+02	1E+01	5E+02	GP	2E-01	2E+00
SW	di-n-Octylphthalate	1E+02	1E-02	5E+00	<>	<>	GP	2E-03	2E-01
SW	Endrin Ketone	1E+02	<>	<>	<>	<>	P	8E-05	8E-03
1-10	Fluoranthene	1E+02	1E+00	5E+02	1E+02	5E+05	GP	2E-03	2E-01
SW	Fluorene	1E+02	1E+00	5E+03	1E+01	5E+04	GP	2E-02	2E+00
SW	gamma-Chlordane	1E+01	1E-01	5E+01	1E+02	5E+06	P	8E-05	8E-04
1-10	2-Hexanone	1E+00	4E-01	2E+00	4E-01	2E+00	G	8E-05	8E-05
1-10	Indeno(1,2,3-cd)pyrene	1E+03	1E-01	5E+03	<>	<>	P	8E-05	8E-02
1-10	Iron	1E+00	1E-02	5E-03	1E-01	5E-02	P	8E-05	8E-05
1-10	Lead	1E+04	1E+02	5E+05	1E+01	5E+02	P	8E-05	8E-01
1-10	Magnesium	NL	<>	<>	<>	<>	P	8E-05	<>
1-10	Manganese	1E+04	1E+02	5E+06	<>	<>	P	8E-05	8E-01
SW	4-Methyl-2-Pentanone	1E+02	4E+01	2E+02	4E-01	2E+00	G	1E+00	1E+02
1-10	Nickel	1E+04	1E+02	5E+04	1E-01	5E-02	P	8E-05	8E-01
SW	Phenanthrene	NL	<>	<>	1E+01	5E+02	GP	2E-02	<>
1-10	Potassium	NL	<>	<>	<>	<>	P	8E-05	<>
1-10	Pyrene	1E+02	1E+00	5E+01	1E+02	5E+03	GP	2E-03	2E-01
1-10	Selenium	1E+02	1E+00	5E+03	1E+01	5E+04	P	8E-05	8E-03
1-10	Tetrachloroethene	1E+02	4E+01	2E+03	4E+01	2E+03	G	1E+00	1E+02
1-10	Toluene	1E+01	4E+00	2E+02	4E+01	2E+03	G	1E+00	1E+01
1-10	Trichloroethane, 1,1,1-	1E+00	4E-01	2E+00	4E+00	2E+01	G	1E+00	1E+00
1-10	Trichloroethylene	1E+01	4E+00	2E+02	4E+01	2E+03	G	1E+00	1E+01
1-10	Vanadium	1E+02	1E+00	5E-01	<>	<>	P	8E-05	8E-03
1-10	Vinyl Chloride	1E+04	7E+00	35	<>	<>	G	1E+00	1E+04
1-10	Zinc	1E+01	1E-01	5E+01	1E-01	5E+01	P	8E-05	8E-04

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Footnote substances not used for scoring purposes.

			SURFACE WATER PATHWAY						
			GROUNDWATER TO SURFACE WATER				AIR		
Source	Hazardous Substance	Toxicity	Tox. x Mob. x Pers. HRST 4-26	Tox. x Mob. x Pers. x Bioacc Pot. HRST 4-28	Ecotox. x Mob. x Pers. HRST 4-29	Ecotox. x Mob. x Pers. x Eco. Bioacc. HRST 4-29	Gaseous/ Particulate HRST 6-13	Mobility HRST 6-11/12	Tox. x Mob. HRST 6-13

NOTES: Liquid-phase waste disposed of in non-karst terrane, fresh water river environment values. Particulate Mobility Factor Value based on HRS Figure 6-3.
* This substance was noted as being historically used on the property. SW = substances found in on-site sediment samples only.
The following substances have been noted as being historically used on the property; however, they are not SCDM substances: brulin and isopropanol.
Trichloroethane, 1,1,1- = Methylchloroform

GROUNDWATER PATHWAY

Pathway Description and Scoring Notes: Describe the Groundwater Migration Pathway. Include the names and brief descriptions of the aquifers underlying the site, the depth to groundwater, the locations of the nearest private and public drinking water supplies and the aquifers from which they draw, and the population relying upon groundwater drawn from within 4-radial miles of the site for their drinking water supplies.

Briefly discuss any sampling events relative to the Groundwater Pathway; provide dates of sampling events and a summary of the analytical results and whether an observed release and/or actual contamination targets were documented.

Indicate any assumptions you have made in scoring the Groundwater Pathway for this site, or any key factors which influence your scoring rationale. Identify a source for the sketch.

Drumlins and bedrock-dominated uplands border the AT&T (former) property to the east and the south. Bedrock beneath the property is thin to thick-bedded metamorphosed calcareous sandstone, siltstone, and minor muscovite schist of Silurian age [16]. Depth to bedrock beneath the property is approximately 80 ft. No bedrock formations mapped within 4-radial miles of the AT&T (former) property exhibit karst characteristics [10]. During field investigations, CDM encountered five basic stratigraphic units present at the AT&T (former) property:

- A fine silty sand layer extends 20 to 40 ft below ground surface.
- Glacial till lies directly above bedrock, and is either exposed at the ground surface or is covered by the fine sand layer.
- Weathered and fractured stone silt and sandstone bedrock.
- A narrow band of coarse sand and gravel extends non-continuously across the property, and is considered a buried post-glacial channel. It is located 60 to 90 ft below ground surface and is approximately 15 to 30 ft thick and is above bedrock. This buried channel is highly transmissive.
- A relatively impermeable but noncontinuous layer of silts and clays, of varying thickness, exists across the property. The silts and clay lie directly below the fine sand and above either the buried channel or bedrock [1, p. 4-1].

Groundwater was present in the shallow overburden system, in the buried channel cover, and in the bedrock. Depth to groundwater ranges from 9 to 25 ft below ground surface across the AT&T (former) property [1, Appendix B]. CDM determined that groundwater flow across the property is generally in a northwesterly direction toward the Merrimack River in both the shallow and deep aquifer systems [1, p. vi].

The average annual precipitation from 1961-1990 for the Lawrence, Massachusetts area, approximately 2 miles from the AT&T (former) property, is 43.08 inches [7].

The following Massachusetts cities and towns are located within 4-radial miles of AT&T (former): Lawrence, Boxford, Methuen, Haverhill, Andover, North Andover, and Groveland [5; 6].

Andover and North Andover obtain their drinking water supply from groundwater wells, reservoirs, and surface water intakes. Of the three groundwater supply wells, only one, Abbott GP Well, is active; however, it is located greater than 4-radial miles from the property. Additionally, there are two community supply wells, Harold Parker Well and Camp Evergreen Well; however, these wells are also located greater than 4-radial miles from the property [11; 15].

Haverhill does not rely on public groundwater wells for their drinking water supply [12; 15].

Methuen obtains drinking water from two community groundwater supplies (Hickory Hill Golf Course and Jimmys II Restaurant) located greater than 4-radial miles from the AT&T (former) property [15].

Groveland obtains their drinking water from two groundwater wells located greater than 4-radial miles from the AT&T (former) property [15].

Lawrence obtains drinking water from a surface water intake and two community groundwater supplies ; the Louise H. Fournier well serving 25 people and the J.H. Horne & Sons Co. well serving 75 people [13; 15]. The Louise H. Fournier supply includes the Bigelow Street Well located 3.7 miles southwest of the property and the May Street Well located 3.4 miles west of the property. The J.H. Horne & Sons Co. supply includes Wells No.1 and No.2 located 3.2 miles southwest of the property. For the purposes of this report it will be assumed that each of these four community wells contributes approximately 25% to their respective populations [15].

Boxford obtains their drinking water from community groundwater wells. Of the 10 active wells, two are located within 4-radial miles of the AT&T (former) property [15]. These two wells include Far Corner Wells No.1 and No. 2 which serve approximately 60 people each. Far Corner Wells No.1 and No.2 are located 1.5 miles east of the AT&T (former) property [14].

The following table identifies public groundwater supply sources within 4-radial miles of the property.

Public Groundwater Supply Sources Within 4-Radial Miles of AT&T (Former)

Distance (miles)/ Direction from Site	Source Name	Location of Source[a]	Estimated Population Served	Source Type[b]
1.5/east	Far Corner Well No.1	Boxford, MA	60	Overburden
1.5/east	Far Corner Well No.2	Boxford, MA	60	Overburden
3.2/southwest	J.H. Horne Well No.1	Lawrence, MA	37	Overburden
3.2/southwest	J.H. Horne Well No.2	Lawrence, MA	38	Overburden
3.7/southwest	Bigelow Street Well	Lawrence, MA	12	Overburden
3.4/west	May Street Well	Lawrence, MA	13	Overburden

[a] Indicates Town in which well is located.
[b] Overburden, Bedrock, or Unknown.

[11-15]

The population relying on private groundwater supplies within 4-radial miles of the property was estimated using equal distribution calculations of the U.S. Census Bureau's CENTRACTS data identifying population, households, and private water wells for "Block Groups" that lie within individual radial distance rings measured from the approximate center of the property. The North Andover Health Department indicated to TtNUS team personnel that there are private wells in North Andover used for drinking water; however, they could not provide the locations of these wells [28]. Based on CENTRACTS data, the nearest private well is located between 0.25-radial and 0.5-radial miles from the property. An estimated 2,365 people within 4-radial miles of the property are served by private groundwater sources [9].

The following table summarizes the estimated drinking water populations served by groundwater sources within 4-radial miles of the AT&T (former) property.

Estimated Drinking Water Populations Served by Groundwater Sources Within 4-Radial Miles of AT&T (Former)

Radial Distance from AT&T (former) Property	Estimated Population Served by Private Wells	Estimated Population Served by Public Wells	Total Estimated Population Served by Groundwater Sources Within the Ring
≥ 0.00 to 0.25	0	0	0
> 0.25 to 0.50	2	0	2
> 0.50 to 1.00	83	0	83
> 1.00 to 2.00	438	120	558
> 2.00 to 3.00	728	0	728
> 3.00 to 4.00	1,114	100	1,214
TOTAL	2,365	220	2,585

[9; 11-15]

In January 1986, AT&T engineers identified "low levels" of chlorinated solvents and petroleum hydrocarbons in water from production wells 1 and 3. Sample results using EPA Methods 601, 602, and 624 indicated that production wells 1 and 3 were contaminated with VOCs [2, p. 2]. Further information regarding this sampling event was not included in available file information.

In December 1992, AT&T workers discovered using draeger tubes TCE contamination [33, p. 14]. In response to the VOC contamination, CDM installed three groundwater monitoring wells (AT&T-1, AT&T-2, and AT&T-3) in Building 30 [1, p. 3-1]. Further information regarding groundwater sampling results was not included in available file information.

In December 1993 and December 1995, CDM collected groundwater samples from on-site monitoring wells which also included production wells (in 1995 only) on the property. The groundwater samples were analyzed for VOCs by EPA Method 8240 [3; 4]. Analytical results indicated a number of VOCs detected in groundwater from the shallow and deep wells at concentrations greater than or equal to the reference sample's SRL [3; 4].

There have been 34 monitoring wells and two extraction wells installed at the property since 1986 to 1999. According to a CDM Updated Phase II Report for Lucent Technologies, 24 of the monitoring wells are sampled on a quarterly basis and all 34 of the wells are sampled on an annual basis. The extraction wells are sampled on a monthly basis. In addition, three production wells are sampled, one quarterly and the others

annually. Groundwater sampling results for all wells, analyzed for VOCs, between 1996 and 1998 have indicated TCE at concentrations up to 470,000 ppb, vinyl chloride at concentrations up to 150 ppb, and 1,1-dichloroethene at concentrations up to 7,800 ppb [1, p. 3-9].

In 1998, Lucent conducted additional subsurface investigations at the property. The focus of the investigations was to evaluate the groundwater quality in the area of the former solvent tank farm for extent of TCE contamination and to determine whether soil gas volatilizing from the groundwater and/or soil in the area was contaminated. Additional monitoring wells were installed by CDM during this investigation were MW-15S, MW-15D, MW-16, MW-17, MW-18, MW-19, and MW-20 [1, p. 3-1]. In December 1998, CDM collected groundwater samples from 31 wells on the property. Samples were analyzed for VOCs using EPA Method 8260 [1, p. 3-9]. Analytical results indicated 11 VOCs detected in groundwater at concentrations above SRLs. SRL values for this sampling event were not included in available file information. The following VOCs were detected in groundwater; acetone, toluene, 1,1-dichloroethylene (1,1-DCE), cis/trans-1,2-dichloroethylene (cis/trans-1,2-DCE), TCE, PCE, chloroform, 1,1 dichloroethane (1,1-DCA), vinyl chloride and 1,1,1-TCA. TCE concentration ranged from 1.8 to 420,000 ppb (MW-14) [1, Table 3-1]. Sampling results have indicated exceedances of GW-3 standards for TCE in several well [1, p. 3-9]. The state requires the site to meet the criteria to classify the groundwater as GW-3 [1, p. ii].

According to Lucent, a Phase IV Remedy Implementation Plan report dated February 2001 was submitted to MADEP by Lucent which includes further site investigation activities and proposed remediation systems [36].

Based on analytical results from previous monitoring well sampling events at the AT&T (Former) property, groundwater beneath the property has been impacted by a release of hazardous substances which appears to be attributable to on-site sources. Additionally, based on the location and proximity of private wells and public water supply wells, no nearby drinking water sources are known or suspected to have been impacted by the release from on-site sources. A groundwater treatment system has been in operation since November 1990. Between November 1990 and December 1998, approximately 500 million gallons of groundwater has been treated and discharged to the Merrimack River. The system removed approximately 3,000 lbs of VOCs, approximately 1,800 lbs of which was TCE [1, p. ii]. According to CDM, the system in place is treating the plume and containing the plume from migration into the Merrimack River [34, p. 1-1].

SI TABLE 4: GROUNDWATER OBSERVED RELEASE SUBSTANCES (BY AQUIFER)

Note: Mobility equals 1 for all observed release substances.

Sample ID	Hazardous Substance	Substance Concentration		Bckgrd. ID.	Bckgrd. Conc.	Tox. × Mob. = Tox.	References
MW-20	Dichloroethene, 1,1-	6,600	ppb	MW-5S		100	1, Tables 3-1/3-2
MW-17	Dichloroethene, trans-1,2-	8	ppb	MW-5S		100	1, Tables 3-1/3-2
MW-20	Toluene	580	ppb	MW-5S		10	1, Tables 3-1/3-2
MW-20	Acetone	2,600	ppb	MW-5S		10	1, Tables 3-1/3-2
MW-14	Trichloroethylene	420,000	ppb	MW-5S		10	1, Tables 3-1/3-2
MW-20	Trichloroethane, 1,1,1-	14,000	ppb	MW-5S		1	1, Tables 3-1/3-2
MW-10S	Vinyl Chloride	28	ppb	MW-5S		10,000	1, Tables 3-1/3-2
MW-14	Dichloroethene, cis-1,2-	18,000	ppb	MW-5S		100	1, Tables 3-1/3-2
MW-20	Dichloroethane, 1,1-	3,800	ppb	MW-5S		10	1, Tables 3-1/3-2
MW-16	Chloroform	1.5	ppb	MW-5S		100	1, Tables 3-1/3-2
MW-06D	Tetrachloroethene	6.8	ppb	MW-1D		100	1, Tables 3-1/3-2
					Highest Value	10,000	

Notes: Hazardous substances listed on SI Table 4 are from the 1998 data. Available file information did not provide detection limits only reported detected compounds. The background wells considered MW-1D for the deep aquifer and MW-5S for the shallow aquifer reference had no compounds detected. Thereby, abovementioned compounds are considered above background.
ppb = Parts per billion

SI TABLE 5: GROUNDWATER ACTUAL CONTAMINATION TARGETS

Notes: Convert all results and SCDM values to ppb or µg/L.
If sum of percents calculated for I or J index is ≥ 100%, consider the well a Level I target; if sum of I or J index is < 100%, consider the well a Level II target.

Well ID: Level I: Level II: Population Served: References:

Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	RfD (J Index)	% of RfD	Cancer Risk Conc. (I index)	% of Cancer Risk Conc.
			Highest Percent		Sum of Percents		Sum of Percents	

SCDM Version: JUN96
Notes: No groundwater actual contamination targets have been identified to date.

GROUNDWATER PATHWAY WORKSHEET

LIKELIHOOD OF RELEASE		Score	Data Type	Refs
1.	OBSERVED RELEASE: If sampling data or direct observation support a release to the aquifer, assign a score of 550. Record observed release substances on SI Table 4.	550	+	1, Tables 3-1/3-2; 3; 4
2.	POTENTIAL TO RELEASE: Depth to aquifer: 30-40 feet. If sampling data do not support a release to the aquifer, and the site is in karst terrain or the depth to aquifer is 70 feet or less, assign a score of 500; otherwise, assign a score of 340. Optionally, evaluate the potential to release according to HRS Section 3.1.2.			
	LR =	550		

TARGETS		Score	Data Type	Refs
	Are any wells part of a blended system? Yes___ No ✓ If yes, attach a page to show apportionment calculations.			
3.	ACTUAL CONTAMINATION TARGETS: If analytical evidence indicates that any target drinking water well for the aquifer has been exposed to a hazardous substance from the site, evaluate the factor score for the number of people served (SI Table 5). Level I: 0 people × 10 = 0 Level II: 0 people × 1 = 0 **Total =**	0	-	
4.	POTENTIAL CONTAMINATION TARGETS: Determine the number of people served by drinking water wells for the aquifer or overlying aquifers that are not exposed to a hazardous substance from the site; record the population for each distance category in SI Table 6. Sum the population values and multiply by 0.1.	31.2	+	9; 11-15
5.	NEAREST WELL: Assign a score of 50 for any Level I Actual Contamination Targets for the aquifer or overlying aquifer. Assign a score of 45 if there are Level II targets but no Level I targets. If no Actual Contamination Targets exist, assign the Nearest Well Score from SI Table 6. If no drinking water wells exist within 4-radial miles, assign a score of 0.	18	+	9; 28
6.	WELLHEAD PROTECTION AREA (WHPA): If any source lies within or above a WHPA for the aquifer, or if a groundwater observed release has occurred within a WHPA, assign a score of 20; assign a score of 5 if neither condition applies but a WHPA is within 4-radial miles; otherwise assign a score of 0.	5	+	21-24
7.	RESOURCES: Assign a resources value of 5 if water drawn from any target well for the aquifer being evaluated or overlying aquifers is used for one or more of the following purposes; assign a score of 0 if none apply. • Irrigation (5-acre minimum) of commercial food crops or commercial forage crops • Watering of commercial livestock • Ingredient in commercial food preparation • Supply for commercial aquaculture • Supply for a major or designated water recreation area, excluding drinking water use	5	-	
	Sum of Targets T =	59.2		

Notes: Resources are assumed.

SI TABLE 6 (FROM HRS TABLE 3-12):
VALUES FOR POTENTIAL CONTAMINATION GROUNDWATER TARGET POPULATIONS

[Other Than Karst Aquifers]

Distance From Site	Pop.	Nearest Well (choose highest)	POPULATION SERVED BY WELLS WITHIN DISTANCE CATEGORY												Pop. Value	Ref.
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1000	1001 to 3000	3001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,001 to 3,000,000		
≥ 0 to 0.25 miles	0	20	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455	0	9; 11-15;24
> 0.25 to 0.5 miles	2	18	2	11	33	102	324	1,013	3,233	10,122	32,325	101,213	323,243	1,012,122	2	9; 11-15; 24
> 0.5 to 1 mile	83	9	1	5	17	52	167	523	1,669	5,224	16,684	52,239	166,835	522,385	17	9; 11-15; 24
> 1 to 2 miles	558	5	0.7	3	10	30	94	294	939	2,939	9,385	29,384	93,845	293,842	94	9; 11-15; 24
> 2 to 3 miles	728	3	0.5	2	7	21	68	212	678	2,122	6,778	21,222	67,777	212,219	68	9; 11-15; 24
> 3 to 4 miles	1,214	2	0.3	1	4	13	42	131	417	1,306	4,171	13,060	41,709	130,596	131	9; 11-15; 24
	Nearest Well =	18												Sum =	312	

Notes:

GROUNDWATER PATHWAY WORKSHEET (Concluded)

WASTE CHARACTERISTICS

		Score	Data Type	Does Not Apply
8.	If any Actual Contamination Targets exist for the aquifer or overlying aquifers, assign the calculated hazardous waste quantity score or a score of 100, whichever is greater; if no Actual Contamination Targets exist, assign the hazardous waste quantity score calculated for sources available to migrate to groundwater.	100	+	
9.	Assign the highest groundwater toxicity × mobility value from SI Table 3 or 4.			

Substance(s)	Vinyl Chloride	Tetrachloroethene	Dichloroethane, 1,2-
Value:	10,000	100	100
From Table:	4	4	4

10. Multiply the groundwater toxicity × mobility and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below: (from HRS Table 2-7)

Product	WC Score	*
0	0	
>0 to <10	1	
≥10 to <100	2	
≥100 to <1,000	3	
≥1,000 to <10,000	6	
≥10,000 to <1E+05	10	
≥1E+05 to <1E+06	18	
≥1E+06 to <1E+07	32	✓
≥1E+07 to <1E+08	56	
≥1E+08 or greater	100	

*check (✓) the WC score calculated for the pathway

WC = 32

Multiply LR by T and by WC. Divide the product by 82,500 to obtain the groundwater pathway score for each aquifer. Select the highest aquifer score. If the pathway score is greater than 100, assign 100.

GROUNDWATER PATHWAY CALCULATION: $\frac{LR \times T \times WC}{82,500} =$ 12.63

(Maximum of 100)

Notes: (550 x 59.2 x 32) / 82,500 = 12.63

SURFACE WATER PATHWAY

Pathway Description and Scoring Notes: Describe the Surface Water Migration Pathway. Identify the nearest source area with non-zero containment for the Surface Water Pathway and the location of the PPE. Include the length of the overland segment. Describe the in-water segment up to the target distance limit noting the stream flow characteristics of each reach and the locations of drinking water intakes, fisheries, and sensitive environments along the 15-mile pathway.

Briefly discuss any sampling events relative to the Surface Water Pathway; provide dates of sampling events and a summary of the analytical results and whether an observed release and/or actual contamination targets were documented.

Indicate any assumptions you have made in scoring the Surface Water Pathway for this site, or any factors which influenced your scoring rationale.

Note: If a site has more than one watershed or has both overland/flood and groundwater to surface water migration potential, document each scenario and use the higher scoring watershed/migration route to calculate the surface water migration pathway score. Provide a summary of the scores for all other watershed/migration routes.

The AT&T (former) property is located within the Merrimack River Drainage Basin, approximately 0.1 miles east of the Merrimack River [5]. According to the Flood Insurance Rate Map for the Town of North Andover, the property is in an area outside of the 500-year floodplain, with the exception of the southwestern portion of the property which is in an area inside of the 500-year floodplain [27].

The topography of the property is generally flat with a gentle slope towards the Merrimack River [10]. The surface water runoff is captured by a series of catch basins and directed to a storm water piping network that conveys the water to one of three culverts for discharge to the Merrimack River [1, p. 4-1; 10; 36]. An unnamed stream, located southeast of the AT&T (former) property, flows onto the property and into a culvert beneath the parking area located at the southern portion of the property. The unnamed culverted stream re-emerges at ground level on the southwestern portion of the property and flows into another unnamed stream. The unnamed stream, which receives overland flow from the adjacent Holt Road Landfill, a MADEP listed site, empties into the Merrimack River [10; 35]. According to Lucent representatives, the culvert stream is perennial [30].

The probable point of entry (PPE) is located in the unnamed culverted stream on the southwestern portion of the property. Surface water flows approximately 0.25 miles into the unnamed stream along the southwestern portion of the property and then flows approximately 0.3 miles northwest into the Merrimack River [10; 30]. The terminus of the 15-mile downstream surface water pathway occurs in the Merrimack River near the intersection of Locus Street and River Road in Merrimac, Massachusetts [5; 6].

The Merrimack River is classified by Massachusetts Department of Environmental Protection (MADEP) Division of Water Pollution Control as a Class SB water supply designated as a habitat for fish or other aquatic life, for primary and secondary contact recreation, and suitable for shellfish harvesting with depuration (Restricted Shellfish Areas) [8]. For the purposes of this report, TtNUS team personnel assume that the culvert and the unnamed stream are not considered a fishery [10; 36].

The average annual flow rate of the Merrimack River, as measured at U.S. Geologic Survey (USGS) Gauging Station No. 01100000, located approximately 12.8 miles upstream of the PPE, is 7,604 cubic feet per second (cfs) [17, p. 43]. Using the USGS

estimating flow factor of 1.8 cfs per square mile and USGS 1:25,000-scale topographic maps, the drainage area of the Merrimack River from Gauging Station No. 01100000 to the terminus of the 15-mile downstream surface water pathway was calculated [18]. Based on these calculations, the flow of the Merrimack River at the AT&T (Former) property is estimated to be 7,669 cfs and the flow of the Merrimack River at the terminus of the 15-mile downstream surface water pathway is estimated to be 7,719 cfs. Based on visual observation, the unnamed culvert stream and the unnamed stream have a flow rate of less than 10 cfs and between 10 and 100 cfs, respectively [10]. There are no surface water drinking water intakes along the 15-mile downstream surface water pathway (Figure 3) [11-15].

Andover and North Andover obtain drinking water from two intakes, Fishbrook Station and Merrimack River. These two surface water intakes, located along the Merrimack River, supply water to Haggetts Pond Reservoir [11; 15]. Haverhill obtains their drinking water supply from reservoirs and surface water intakes [12; 15]. However, these surface water intakes do not occur along the 15-mile downstream surface water pathway from the AT&T (former) property.

Methuen and Lawrence obtain their drinking water from the Merrimack River upstream of the AT&T (former) property [13; 15].

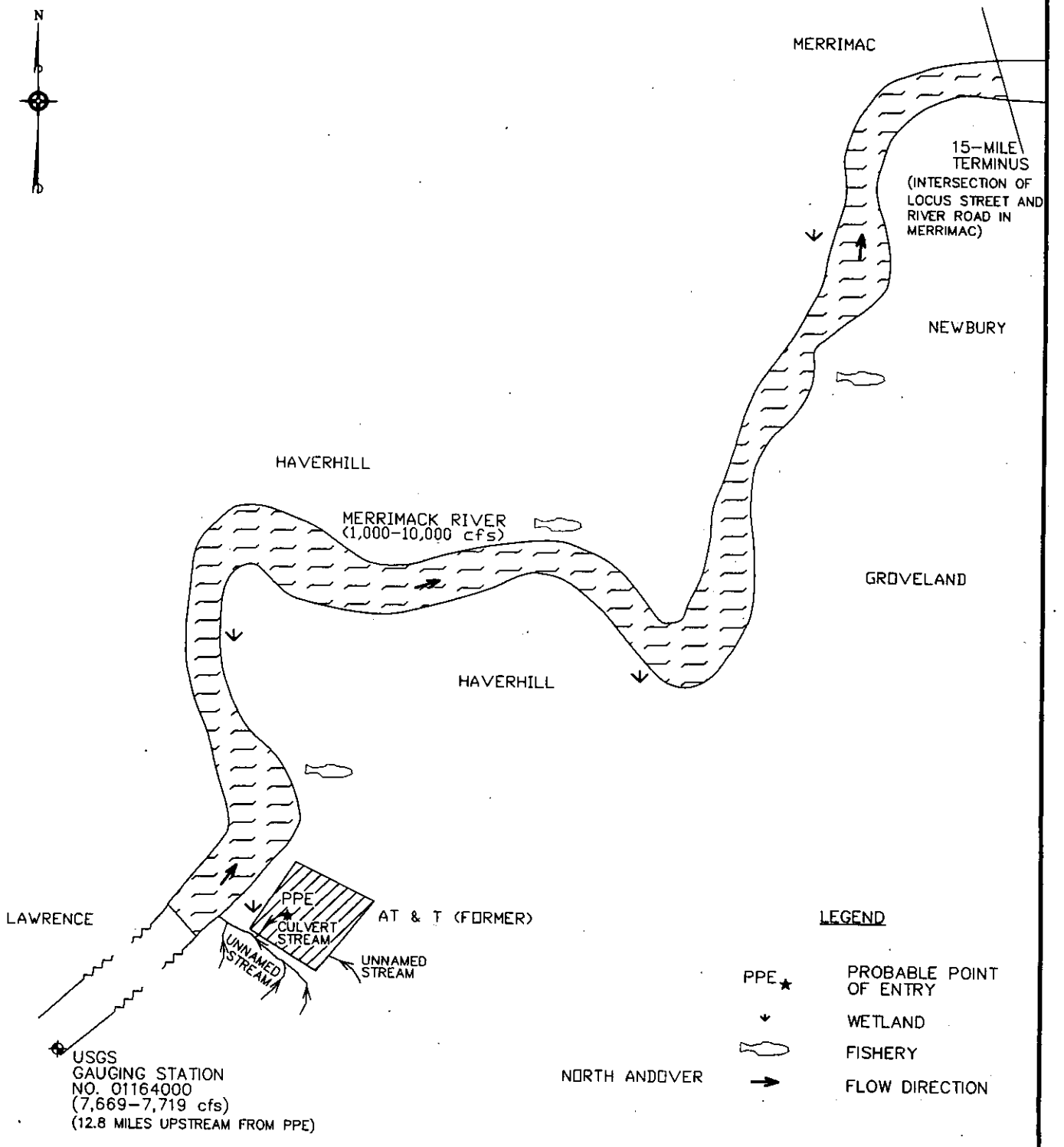
The following table summarizes surface water bodies located along the 15-mile downstream pathway from the property.

Surface Water Bodies Along the 15-Mile Downstream Pathway from AT&T (Former)

Surface Water Body	Descriptor[a]	Length of Reach (miles)	Flow Characteristics (cfs)[b]	Length of Wetland Frontage (miles)
Unnamed Culverted Stream	Minimal Stream	0.25	<10	0.1
Unnamed Stream	Small to Moderate Stream	0.3	> 10-100	0.1
Merrimack River	Large Stream to River	14.45	> 7,669-7,719	1.7

[a] Minimal Stream <10 cfs. Large stream to river > 1,000 to 10,000 cfs.
[b] Cubic feet per second.

[17; 18; 20]



SURFACE WATER PATHWAY			FIGURE 3
AT & T (FORMER)			
NORTH ANDOVER, MASSACHUSETTS			
DRAWN BY:	D.W. MACDOUGALL	REV.:	0
CHECKED BY:	J. PILLION	DATE:	AUGUST 3, 2001
SCALE:	NOT TO SCALE	ACAD NAME:	DWG\0073\1880\FIG_3.DWG

TETRA TECH NUS, INC.
55 Jonspin Road Wilmington, MA 01887
(978)658-7899

There are two State endangered species, three State threatened species, and one Federal threatened/state endangered species within 15 downstream miles of the property [19]. The following table summarizes sensitive environments located along the 15-mile downstream pathway from the property.

Sensitive Environments Along the 15-Mile Downstream Pathway from AT&T (Former)

Sensitive Environment Name	Sensitive Environment Type	Surface Water Body	Downstream Distance from PPE (miles)	Flow Rate at Environment (cfs)[a]
CWA	CWA	Unnamed Culvert Stream	0	<10
Wetland	0.1 miles of wetlands	Unnamed Culvert Stream	0.2	<10
Wetland	0.1 miles of wetlands	Unnamed Stream	0.4	>10-100
Wetland	1.7 miles of wetlands	Merrimack River	0.55 to 15	> 7,669-7,719
State Endangered	Animal	Merrimack River	2.61	> 7,669-7,719
State Threatened	Plant	Merrimack River	5.36	> 7,669-7,719
State Endangered	Plant	Merrimack River	10.05	> 7,669-7,719
State Threatened	Plant	Merrimack River	10.59	> 7,669-7,719
State Threatened	Plant	Merrimack River	10.65	> 7,669-7,719
Federal Threatened/ State Endangered	Animal	Merrimack River	12.76	> 7,669-7,719

[a] Cubic feet per second
CWA = Clean Water Act

[17-24]

On April 11, 2000, TtNUS team personnel collected five sediment samples, including QA/QC samples, from the unnamed culverted stream on the property as part of the AT&T (former) property SI [10]. The sediment samples were analyzed for VOCs, SVOCs, pesticides/PCBs, total metals, and cyanide through a DAS laboratory [31; 32]. Sediment samples SD-01 and SD-02 were selected as reference samples. Global positioning of the sediment sample locations was collected by TtNUS team personnel [10]. The following table summarizes the sediment samples collected by TtNUS on April 11, 2000.

Sample Summary: AT&T (Former)
Sediment Samples Collected by TtNUS on April 11, 2000

Sample Location No.	Traffic Report No.	Time (hrs)	Grab/ Comp	Sample Depth (Inches)	GPS Data (Latitude/ Longitude)	Sample Information
MATRIX: Sediment						
18-SD-01 (Background)	DO1203	1021	Grab	0 to 6	42° 43′ 41.9″ N 71° 06′ 48.1″ W	Reference sediment sample collected in the unnamed culvert stream at the southeast corner of the property. Sample appeared to be olive brown sandy loam; PID = 0.
18-SD-02 (background metals only)	DO1204	1030	Grab	0 to 6	42° 43′ 41.6″ N 71° 06′ 48.1″ W	Reference (metals only) sediment sample collected in the unnamed culvert stream at the southeast corner of the property. Sample appeared to be black to olive brown sandy loam; PID = 0.
18-SD-03 MS/MSD	DO1202	0950	Grab	0 to 6	42° 43′ 41.7″ N 71° 07′ 06.1″ W	Sediment sample collected in the unnamed culvert stream, ~300 feet downstream of the PPE. Sample appeared to be olive green sandy loam with ~1-millimeter diameter pebbles; PID = 0.
18-SD-04	DO1200	0929	Grab	0 to 6	42° 43′ 38.8″ N 71° 07′ 11.1″ W	Sediment sample collected in unnamed culvert stream ~900 feet downstream from SD-03 and ~1,200 feet downstream of the PPE. Sample appeared to be black fine silty loam; PID = 0.
18-SD-DUP-01	DO1201	0916	Grab	0 to 6	42° 43′ 38.8″ N 71° 07′ 11.2″ W	Duplicate of 18-SD-04, collected for quality control.

MS/MSD = Matrix Spike/Matrix Spike Duplicate
~ = Approximately
PID = Photoionization Detector
GPS = Global Positioning System
Comp. = Composite
hrs = hours
PPE = Probable Point of Entry

[10]

For each sample location, a compound or element is listed if it is detected at three times or greater than the reference sample concentration. However, if the compound or element is not detected in the reference sample, the reference sample's sample quantitation limit (SQL) or sample detection limit (SDL) is used as the reference value. These compounds or elements are listed if they occurred at a value equal to or greater than the reference sample's SQL or SDL and are designated by their approximate relative concentration above these values. The following table summarizes substances detected through DAS analysis of sediment samples collected by TtNUS team personnel on April 11, 2000.

Summary of Analytical Results
Sediment Sample Analysis for AT&T (Former)
Collected by TtNUS Team Personnel on April 11, 2000

Sample Location	Compound/ Element	Sample Concentration			Reference Concentration			Comments
18-SD-03 (DO1202)	**SVOCs**							
	fluorene	220	J	ppb	33	J	ppb	6.7 × REF
	phenanthrene	1,700		ppb	420		ppb	4 × REF
	anthracene	240	J	ppb	82	J	ppb	3 × REF
	carbazole	240	J	ppb	70	J	ppb	3.4 × REF
	fluoranthene	1,900		ppb	650		ppb	3 × REF
	pyrene	2,700	*	ppb	870		ppb	3.1 × REF
	butylbenzylphthalate	300	J	ppb	50	J	ppb	6 × REF
	chrysene	1,200		ppb	410		ppb	3 × REF
	bis(2-EH)phthalate	1,800		ppb	330		ppb	5.5 × REF
	di-n-octylphthalate	290	J	ppb	65	J	ppb	4.5 × REF
	benzo(b)fluoranthene	1,800		ppb	570		ppb	3.2 × REF
	benzo(k)fluoranthene	750		ppb	250	J	ppb	3 × REF
	indeno(1,2,3-cd)pyrene	700		ppb	210	J	ppb	3.3 × REF
	benzo(g,h,i)perylene	650		ppb	210	J	ppb	3.1 × REF
	PESTICIDEs							
	gamma-chlordane	3.1	P	ppb	1.6	U	ppb	2 × SQL
	INORGANICs							
	cyanide	1.7		ppm	0.53		ppm	3.2 × REF

18-SD-DUP-01 (DO1201)	**VOCs**							
	acetone	330		ppb	65	B	ppb	5.1 × REF
	2-butanone	48		ppb	10	J	ppb	4.8 × REF
	4-methyl-2-pentanone	17	J	ppb	4	J	ppb	4.3 × REF
	SVOCs							
	benzo(b)fluoranthene	1,800		ppb	570		ppb	3.2 × REF
	indeno(1,2,3-cd)pyrene	670		ppb	210	J	ppb	3.2 × REF
	benzo(g,h,i)perylene	630		ppb	210	J	ppb	3 × REF
	benzaldehyde	98	J	ppb	22	J	ppb	4.5 × REF
	PESTICIDEs/PCBs							
	endrin ketone	6.8	P	ppb	3.2	U	ppb	2.1 × SQL
	gamma-chlordane	6.9		ppb	1.6	U	ppb	4.3 × SQL
	aroclor-1254	54		ppb	32	U	ppb	1.7 × SQL
	INORGANICs							
	cyanide	1.9		ppm	0.53		ppm	3.6 × REF
18-SD-04 (DO1200)	**SVOCs**							
	fluoranthene	1,900		ppb	650		ppb	3 × REF
	benzo(a)anthracene	1,100		ppb	350		ppb	3.1 × REF
	chrysene	1,500		ppb	410		ppb	3.7 × REF
	benzo(b)fluoranthene	2,500		ppb	570		ppb	4.4 × REF
	benzo(k)fluoranthene	900		ppb	250	J	ppb	3.6 × REF
	benzo(a)pyrene	1,200		ppb	350		ppb	3.4 × REF
	indeno(1,2,3-cd)pyrene	1,000		ppb	210	J	ppb	4.8 × REF
	dibenzo(a,h)anthracene	240	J	ppb	63	J	ppb	3.8 × REF
	benzo(g,h,i)perylene	930		ppb	210	J	ppb	4.4 × REF
	pyrene	2,600		ppb	870		ppb	3 × REF
	PESTICIDEs/PCBs							
	gamma-chlordane	6.7	P	ppb	1.6	U	ppb	4.2 × SQL
	aroclor-1254	84		ppb	32	U	ppb	2.6 × SQL

18-SD-04 (continued)	**INORGANICs**							
	Selenium	1.1	N	ppm	0.78	UN	ppm	1.4 × SDL

VOCs = Volatile organic compounds.
SVOCs = Semivolatile organic compounds.
PCBs = Polychlorinated Biphenyls
ppb = Parts per billion.
ppm = Parts per million.
SQL = Sample quantitation limit.
SDL = Sample detection limit.
REF = Reference sample concentration.
U = The compound was analyzed for and was not detected.
B = In laboratory blank (organic analysis).
J = Estimated value below contract required quantitation limit.
P = Greater than 25% deviation between columns
N = Spike %R greater than limit.
* = Result from dilution analysis
[31; 32]

Complete analytical results for the sediment samples including quantitation and detection limits are presented in Attachment A. Analytical results of the sediment samples indicated that three VOCs, 18 SVOCs, two pesticides, one PCB, and two inorganics were detected above the reference sample concentration (SD-01 or SD-02). Concentrations ranged from 1.4 times the SDL (selenium in SD-04) to 6.7 times the reference sample (fluorene in SD-03) [31; 32]. SVOCs and gamma-chlordane (pesticide) were detected in every sediment sample location in the unnamed culverted stream.

Of the substances indicated in the abovementioned table, acetone, 2-butanone, anthracene, fluoranthene, pyrene, chrysene, bis(2-ethyl hexyl) phthalate, benzo(b)fluoranthene, benzo(a)anthracene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, benzo(g,h,i)perylene, benzaldehyde, cyanide, and selenium were also detected in soil/source samples collected by TtNUS team personnel from the AT&T (former) property [31; 32]. Please refer to the General Information section for further information on soil/source sample analytical results.

Based on analytical results from TtNUS team personnel sediment sampling, the surface water pathway has been impacted by a release of hazardous substances to the unnamed culverted stream from on-site sources. No known public drinking water intakes are located along the 15-mile downstream pathway.

SI TABLE 7: SURFACE WATER OBSERVED RELEASE SUBSTANCES

List all substances that meet the criteria for an observed release to surface water; however, do not eliminate a substance from this table if it has a BCF of less than 500.

Sample ID	Hazardous Substance	Substance Concentration	Bckgrd. ID.	Bckgrd. Conc.	BCF HRS Table 4-15	Toxicity × Persistence	Toxicity × Persis. × Bioaccum	Ecotoxicity × Persis. × Ecobioaccum	References
SD-03	fluorene	220 J ppb	SD-01	33 J ppb	5,000	100	5E+05	5E+06	31
SD-03	phenanthrene	1,700 ppb	SD-01	420 ppb	5,000	<>	<>	5E+06	31
SD-03	anthracene	240 J ppb	SD-01	82 J ppb	5,000	10	50,000	5E+07	31
SD-03	carbazole	240 J ppb	SD-01	70 J ppb	500	4	2,000	<>	31
SD-03	fluoranthene	1,900 ppb	SD-01	650 ppb	500	100	5E+04	5E+06	31
SD-03	pyrene	2,700 0 ppb	SD-01	870 ppb	50	100	5,000	5E+05	31
SD-03	butylbenzylphthalate	300 J ppb	SD-01	50 J ppb	500	10	5,000	5E+04	31
SD-03	bis(2-ethylhexyl)phthalate	1,800 ppb	SD-01	330 ppb	50,000	100	5E+06	5E+07	31
SD-03	di-n-octylphthalate	290 J ppb	SD-01	65 J ppb	500	100	5E+04	<>	31
SD-DUP-01	acetone	330 ppb	SD-01	65 B ppb	0.5	4	2	20	31
SD-DUP-01	2-butanone	48 ppb	SD-01	10 J ppb	0.5	4	2	0.2	31
SD-DUP-01	4-methyl-2-pentanone	17 J ppb	SD-01	4 J ppb	5	40	200	2	31
SD-DUP-01	benzaldehyde	98 J ppb	SD-01	22 J ppb	NL	<>	<>	<>	31
SD-DUP-01	endrin ketone	6.8 P ppb	SD-01	3.2 U ppb	0.5	40	20	<>	31
SD-DUP-01	gamma-chlordane	6.9 ppb	SD-01	1.6 U ppb	500	10	5,000	5E+08	31
SD-DUP-01	cyanide	1.9 ppm	SD-01	0.53 ppm	0.5	40	20	200	32
SD-04	benzo(a)anthracene	1,100 ppb	SD-01	350 ppb	50,000	1,000	5E+07	5E+08	31
SD-04	chrysene	1,500 ppb	SD-01	410 ppb	5,000	10	5E+04	5E+06	31
SD-04	benzo(b)fluoranthene	2,500 ppb	SD-01	570 ppb	50,000	1,000	5E+07	<>	31
SD-04	benzo(k)fluoranthene	900 ppb	SD-01	250 J ppb	50,000	100	5E+06	<>	31
SD-04	benzo(a)pyrene	1,200 ppb	SD-01	350 ppb	50,000	10,000	5E+08	5E+08	31

SD–04	indeno(1,2,3-cd)pyrene	1,000		ppb	SD-01	210	J	ppb	50,000	1,000	5E+07	<>	31
SD–04	dibenzo(a,h)anthracene	240	J	ppb	SD-01	63	J	ppb	50,000	10,000	5E+08	<>	31
SD–04	benzo(g,h,i)perylene	930		ppb	SD-01	210	J	ppb	50,000	<>	<>	<>	31
SD-04	selenium	1.1	N	ppm	SD-01	0.78	UN	ppm	5,000	100	5E+05	5E+06	32
SD–04	aroclor-1254	84		ppb	SD-01	32	U	ppb	50,000	10,000	5E+08	5E+08	31
									Highest Values	10,000	5E+08	5E+08	

Notes:

U = The compound was analyzed for and was not detected
B = In laboratory blank (organic analysis)
J = estimated value below contract required quantitation limit
P = greater than 25% deviation between columns
N = Spike % R greater than limit
* = Result from dilution analysis.

SI TABLE 8: SURFACE WATER DRINKING WATER ACTUAL CONTAMINATION TARGETS

Notes: Convert all results and SCDM values to ppb or µg/L.
If sum of percents calculated for I or J index is ≥ 100%, consider the intake a Level I target; if sum of I or J index is < 100 %, consider the intake a Level II target.

Intake ID: Sample Type: Level I: Level II: Population Served: References:

Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	RfD (J Index)	% of RfD	Cancer Risk Conc. (I index)	% of Cancer Risk Conc.
			Highest Percent		Sum of Percents		Sum of Percents	

SCDM Version: JUN96
Notes: No surface water drinking water actual contamination targets have been identified to date.

SURFACE WATER PATHWAY
LIKELIHOOD OF RELEASE AND DRINKING WATER THREAT WORKSHEET

LIKELIHOOD OF RELEASE - OVERLAND/FLOOD MIGRATION

		Score	Data Type	Refs
1.	OBSERVED RELEASE: If sampling data or direct observation support a release to surface water in the watershed, assign a score of 550. Record observed release substances on SI Table 7.	550	+	2; 31; 32
2.	POTENTIAL TO RELEASE: Distance to surface water: _____ (feet) If sampling data do not support a release to surface water in the watershed, use the table below to assign a score from the table below based on the distance to surface water and flood frequency.			

Distance to surface water <2500 feet	500
Distance to surface water >2500 feet, and:	
Site in annual or 10-yr floodplain	500
Site in 100-yr floodplain	400
Site in 500-yr floodplain	300
Site outside 500-yr floodplain	100

Optionally, evaluate surface water potential to release according to HRS Section 4.1.2.1.2

LR = 550

LIKELIHOOD OF RELEASE - GROUNDWATER TO SURFACE WATER MIGRATION

		Score	Data Type	Refs
1.	OBSERVED RELEASE: If sampling data or direct observation support a release to surface water in the watershed, assign a score of 550. Record observed release substances on SI Table 7.			
NOTE:	Evaluate groundwater to surface water migration only for a surface water body that meets all of the following conditions:			
1)	A portion of the surface water is within 1 mile of site sources having a containment factor greater than 0.			
2)	No aquifer discontinuity is established between the source and the above portion of the surface water body.			
3)	The top of the uppermost aquifer is at or above the bottom of the surface water. Elevation of top of uppermost aquifer: NA Elevation of bottom of surface water body: NA			
2.	POTENTIAL TO RELEASE: Depth to aquifer: 30 to 40 feet. If sampling data do not support a release to the aquifer, and the site is in karst terrain or the depth to aquifer is 70 feet or less, assign a score of 500: otherwise assign a score of 340. Optionally, evaluate potential to release according to HRS Section 3.1.2.			

LR = NA

Notes: NA - Not Associated

SURFACE WATER PATHWAY
LIKELIHOOD OF RELEASE AND DRINKING WATER THREAT WORKSHEET
(Continued)

DRINKING WATER THREAT TARGETS	Score	Data Type	Refs
Record the water body type, flow, and number of people served by each drinking water intake within the distance limit in the watershed. If there is no drinking water intake within the target distance limit, assign a score of 0 to factors 3, 4, and 5.			

Intake Name	Water Body Type	Flow	People Served

Are any intakes part of a blended system? Yes ___ No ___
If yes, attach a page to show apportionment calculations.

3.	ACTUAL CONTAMINATION TARGETS: If analytical evidence indicates a drinking water intake has been exposed to a hazardous substance from the site, list the intake name and evaluate the factor score for the drinking water population (SI Table 8). Level I: 0 people × 10 = 0 Level II: 0 people × 1 = 0	Total =	0	-	
4.	POTENTIAL CONTAMINATION TARGETS: Determine the number of people served by drinking water intakes for the watershed that have not been exposed to a hazardous substance from the site. Assign the population values from SI Table 9. Sum the values and multiply by 0.1.		0	-	
5.	NEAREST INTAKE: Assign a score of 50 for any Level I Actual Contamination Drinking Water Targets for the watershed. Assign a score of 45 if there are Level II targets for the watershed, but no Level I targets. If no Actual Contamination Drinking Water Targets exist, assign a score for the intake nearest the PPE from SI Table 9. If no drinking water intakes exist, assign a score of 0.		0	-	
6.	RESOURCES: Assign a value of 5, if within the in-water segment of the hazardous substance migration path for the watershed, the surface water is used for one or more of the following purposes; assign a value of 0 if none apply. • Irrigation (5-acre minimum) of commercial food crops or commercial forage crops • Watering of commercial livestock • Ingredient in commercial food preparation • Major/designated water recreation area, excluding drinking water use. Additionally, assign a value of 5 if the surface water is not used for drinking water, but either of the following applies: • Any portion of the surface water is designated by a state for drinking water use. • Any portion of the surface water is usable for drinking water purposes.		5	-	
		Sum of Targets T =	5		

Notes: Resources are assumed.

SI TABLE 9 (FROM HRS TABLE 4-14): DILUTION-WEIGHTED POPULATION VALUES FOR POTENTIAL CONTAMINATION FOR SURFACE WATER MIGRATION PATHWAY[a]

Type of Surface Water Body[b]	Pop.	Nearest Intake	NUMBER OF PEOPLE								Pop. Value
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,000	10,001 to 30,000	
Minimal Stream (<10 cfs)	0	20	4	17	53	164	522	1,633	5,214	16,325	
Small to moderate stream (10 to 100 cfs)	0	2	0.4	2	5	16	52	163	521	1,633	
Moderate to large stream (>100 to 1,000 cfs)	0	0	0.04	0.2	0.5	2	5	16	52	163	
Large Stream to river (>1,000 to 10,000 cfs)	0	0	0.004	0.02	0.05	0.2	0.5	2	5	16	
Large River (> 10,000 to 100,000 cfs).	0	0	0	0.002	0.005	0.02	0.05	0.2	0.5	2	
Very Large River (>100,000 cfs)	0	0	0	0	0.001	0.002	0.005	0.02	0.05	0.2	
Shallow ocean zone or Great Lake (depth < 20 feet)	0	0	0	0.002	0.005	0.02	0.05	0.2	0.5	2	
Moderate ocean zone or Great Lake (Depth 20 to 200 feet)	0	0	0	0	0.001	0.002	0.005	0.02	0.05	0.2	
Deep ocean zone or Great Lake (depth > 200 feet)	0	0	0	0	0	0.001	0.003	0.008	0.03	0.08	
3-mile mixing zone in quiet flowing river (> 10 cfs)	0	10	2	9	26	82	261	817	2,607	8,163	

SI TABLE 9 (FROM HRS TABLE 4-14): DILUTION-WEIGHTED POPULATION VALUES FOR POTENTIAL CONTAMINATION FOR SURFACE WATER MIGRATION PATHWAY[a] (Continued)

Type of Surface Water Body	Pop.	NUMBER OF PEOPLE					Pop. Value
		30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,001 to 3,000,000	3,000,001 to 10,000,000	
Minimal Stream (<10 cfs)	0	52,137	163,246	521,360	1,632,455	5,213,590	
Small to moderate stream (10 to 100 cfs)	0	5,214	16,325	52,136	163,245	521,359	
Moderate to large stream (>100 to 1,000 cfs)	0	521	1,633	5,214	16,325	52,136	
Large Stream to river (>1,000 to 10,000 cfs)	0	52	163	521	1,632	5,214	
Large River (>10,000 to 100,000 cfs)	0	5	16	52	163	521	
Very Large River (>100,000 cfs)	0	0.5	2	5	16	52	
Shallow ocean zone or Great Lake (depth < 20 feet)	0	5	16	52	163	521	
Moderate ocean zone or Great Lake (Depth 20 to 200 feet)	0	0.5	2	5	16	52	
Deep ocean zone or Great Lake (depth > 200 feet)	0	0.3	1	3	8	26	
3-mile mixing zone in quiet flowing river (> 10 cfs)	0	26,068	81,623	260,680	816,227	2,606,795	
						Sum =	0

[a] Round the number of people to nearest integer. Do not round the assigned dilution-weighted population value to nearest integer.

[b] Treat each lake as a separate type of water body and assign it a dilution-weighted population value using the surface water body type with the same dilution weight from HRS Table 4-13 as the lake. If drinking water is withdrawn from coastal tidal water or the ocean, assign a dilution-weighted population value to it using the surface water body type with the same dilution weight from HRS Table 4-13 as the coastal tidal water or the ocean zone.

SI TABLE 10: HUMAN FOOD CHAIN ACTUAL CONTAMINATION TARGETS FOR WATERSHED

Notes: Convert all results and SCDM values to µg/kg or ppb.
If sum of percents calculated for I or J index is ≥ 100%, consider the fishery a Level I target; if sum of I or J index is < 100 % consider the fishery a Level II target. List only those substances that meet the observed release criteria in a fishery within the target distance limit and have a BCF of ≥ 500; BCF values are found on SI Table 7.

Fishery ID: Sample Type: Level I: Level II: References:

Sample ID	Hazardous Substance	Conc. (µg/kg)	Benchmark Conc. (FDAAL)	% of Benchmark	RfD (J index)	% of RfD	Cancer Risk Conc. (I index)	% of Cancer Risk Conc.
			Highest Percent		Sum of Percents		Sum of Percents	

Notes: No human food chain actual contamination targets for watershed have been identified to date. The unnamed culvert stream is not considered a fishery.
Reference Sample:

SI TABLE 11: SENSITIVE ENVIRONMENT ACTUAL CONTAMINATION TARGETS FOR WATERSHED

Notes: Convert all results and SCDM values to µg/L or ppb.
If the highest % of benchmark calculated is ≥ 100%, consider the sensitive environment a Level I target; if the highest % of benchmark calculated is <100%, consider the sensitive environment a Level II target.

Environment ID: 0.1 miles wetlands/CWA Sample Type: Sediment Level I: Level II: ✓ Environment Value: 25/5

Sample ID	Hazardous Substance	Substance Concentration			Benchmark Conc. (AWQC or AALAC)	% of Benchmark	References
SD-03	fluorene	220	J	ppb	NA	NA	31
SD-03	phenanthrene	1,700		ppb	NA	NA	31
SD-03	anthracene	240	J	ppb	NA	NA	31
SD-03	carbazole	240	J	ppb	NA	NA	31
SD-03	fluoranthene	1,900		ppb	NA	NA	31
SD-03	pyrene	2,700	0	ppb	NA	NA	31
SD-03	butylbenzylphthalate	300	J	ppb	NA	NA	31

SD-03	bis(2-ethylhexyl)phthalate	1,800		ppb	NA	NA	31
SD-03	di-n-octylphthalate	290	J	ppb	NA	NA	31
SD-DUP-01	acetone	330		ppb	NA	NA	31
SD-DUP-01	2-butanone	48		ppb	NA	NA	31
SD-DUP-01	4-methyl-2-pentanone	17	J	ppb	NA	NA	31
SD-DUP-01	benzaldehyde	98	J	ppb	NA	NA	31
SD-DUP-01	endrin ketone	6.8	P	ppb	NA	NA	31
SD-DUP-01	gamma-chlordane	6.9		ppb	NA	NA	31
SD-DUP-01	cyanide	1.9		ppm	NA	NA	32
SD-04	benzo(a)anthracene	1,100		ppb	NA	NA	31
SD-04	chrysene	1,500		ppb	NA	NA	31
SD-04	benzo(b)fluoranthene	2,500		ppb	NA	NA	31
SD-04	benzo(k)fluoranthene	900		ppb	NA	NA	31
SD-04	benzo(a)pyrene	1,200		ppb	NA	NA	31
SD-04	indeno(1,2,3-cd)pyrene	1,000		ppb	NA	NA	31
SD-04	dibenzo(a,h)anthracene	240	J	ppb	NA	NA	31
SD-04	benzo(g,h,i)perylene	930		ppb	NA	NA	31
SD-04	selenium	1.1	N	ppm	NA	NA	32
SD-04	aroclor-1254	84		ppb	NA	NA	31
					Highest Percent	NA	

SCDM Version: JUN96
Notes: NA = Not associated
ppb = parts per billion
ppm = parts per million
J = Estimated value below contract required quantitation limit
P = Greater than 25% deviation between columns
* = Result from dilution analysis
N = Spike % R greater than limit

SURFACE WATER PATHWAY (Continued)
HUMAN FOOD CHAIN THREAT WORKSHEET

HUMAN FOOD CHAIN THREAT TARGETS	Score	Data Type	Refs
Record the water body type and flow for each fishery within the target distance limit. If there is no fishery within the target distance limit, assign a score of 0 at the bottom of this page.			
Fishery Name: Merrimack River Species: Unknown Water Body: Merrimack River Production: > 0 lbs/yr Flow: 1,000 - 10,000 cfs			
FOOD CHAIN INDIVIDUAL (FCI) (Select highest value) 7. ACTUAL CONTAMINATION FISHERIES: Assign 50 points for a Level I fishery only if tissue samples document an observed release of a substance with a BCF ≥ 500 to a fishery within the target distance limit (SI Table 10). List substance(s):_____. Assign 45 points for a Level II fishery if surface water/sediment samples document an observed release of a substance with a BCF ≥ 500 to a fishery within the target distance limit (SI Table 10). List substance (s): 8. POTENTIAL CONTAMINATION FISHERIES: Assign 20 points for a potential fishery if there is an observed release of a substance with a BCF ≥ 500 (SI Table 7) to a watershed containing fisheries within the target distance limit, but no Level I or Level II fisheries are scored because there is no fishery documented between the PPE and the most downstream observed release sample point. If there is no observed release of a substance with a BCF ≥ 500 to a watershed, assign a value for potential contamination fisheries from the table below using the lowest flow of all fisheries within the target distance limit.			

Lowest Flow	FCI Value
<10 cfs	20
10 to 100 cfs	2
>100 cfs, coastal tidal waters, oceans, or Great Lakes	0
3-mile mixing zone in quiet flowing river	10

	Score	Data Type	Refs
FCI Value =	0	+	17; 18
Targets T =	0		

Notes:

SURFACE WATER PATHWAY (Continued)
ENVIRONMENTAL THREAT WORKSHEET

When measuring length of wetlands that are located on both sides of a surface water body, sum both frontage lengths. For a sensitive environment that is more than one type, assign a value for each type.

ENVIRONMENTAL THREAT TARGETS

	Score	Data Type	Refs

Record the water body and flow for each surface water sensitive environment within the target distance limit (see SI Table 12). If there is no sensitive environment within the target distance limit, assign a score of 0 at the bottom of the page.

Environment Type (SI Table 13)	Water Body Name	Flow (cfs)
Clean Water Act	Unnamed Culveredt Stream	<10
0.1 miles wetlands	Unnamed Culverted Stream	<10
0.1 miles wetlands	Unnamed Stream	>10-100
1.7 miles wetlands	Merrimack River	>1,000-10,000
Two State Endangered Species	Merrimack River	>1,000-10,000
Three State Threatened Species	Merrimack River	>1,000-10,000
One Federal Threatened Species	Merrimack River	>1,000-10,000

9. ACTUAL CONTAMINATION SENSITIVE ENVIRONMENTS: If sampling data or direct observation indicate that any sensitive environment has been exposed to a hazardous substance from the site, record this information on SI Table 11, and assign a factor value for the environment (SI Tables 13 and 14).

Substance(s): _____ _____ _____

From Table : _____ _____ _____

Environment Type (SI Table 13)	Environment Value (SI Tables 13 & 14)	Multiplier (10 for Level I, 1 for Level II)		Product
0.1 miles wetland	25	× 1	=	25
Clean Water Act	5	× 1	=	5
		×	=	
		×	=	
			Sum =	30

Score: + | Data Type: + | Refs: 20; 31;32

10. POTENTIAL CONTAMINATION SENSITIVE ENVIRONMENTS:

Flow	Dilution weight (SI Table 12)	Environment Type and Value (SI Tables 13 & 14)	Pot. Cont.	Product
>10-100	0.1 ×	(0.1 miles wetlands) 25 ×	0.1 =	0.25
>1,000-10,000	0.001 ×	(1.7 miles wetlands) 50 ×	0.1 =	0.005
>1,000-10,000	0.001 ×	2 (State Endangered) 50 ×	0.1 =	0.01
>1,000-10,000	0.001 ×	3 (State Threatened) 50 ×	0.1 =	0.015
>1,000-10,000	0.001 ×	(Federal Threatened) 75 ×	0.1 =	0.0075
			Sum =	0.2875

Sum of Targets T = 30.2875

Notes:

SI TABLE 12 (HRS TABLE 4-13):

SURFACE WATER DILUTION WEIGHTS

*	TYPE OF SURFACE WATER BODY		Assigned Dilution Weight
	Descriptor	**Flow Characteristics**	
✓	Minimal stream	< 10 cfs	1
✓	Small to moderate stream	10 to 100 cfs	0.1
	Moderate to large stream	> 100 to 1,000 cfs	0.01
✓	Large stream to river	> 1,000 to 10,000 cfs	0.001
	Large river	> 10,000 to 100,000 cfs	0.0001
	Very large river	> 100,000 cfs	0.00001
	Coastal tidal waters	Flow not applicable; depth not applicable	0.0001
	Shallow ocean zone or Great Lake	Flow not applicable; depth less than 20 feet	0.0001
	Moderate depth ocean zone or Great Lake	Flow not applicable; depth 20 to 200 feet	0.00001
	Deep ocean zone or Great Lake	Flow not applicable; depth greater than 200 feet	0.000005
	3-mile mixing zone in quiet flowing river	10 cfs or greater	0.5

* Check all (✓) appropriate dilution weights.

Notes:

SI TABLE 13 (HRS TABLE 4-23):

SURFACE WATER AND AIR SENSITIVE ENVIRONMENT VALUES

*	Sensitive Environment	Assigned Value
	Critical habitat for Federal designated endangered or threatened species Marine Sanctuary National Park Designated Federal Wilderness Area Ecologically important areas identified under the Coastal Zone Wilderness Act Sensitive Areas identified under the National Estuary Program or Near Coastal Water Program of the Clean Water Act Critical Areas identified under the Clean Lakes Program of the Clean Water Act (subareas in lakes or entire small lakes) National Monument (air pathway only) National Seashore Recreation Area National Lakeshore Recreation Area	100
✓	Habitat known to be used by Federal designated or proposed endangered or threatened species National Preserve National or State Wildlife Refuge Unit of Coastal Barrier Resources System Coastal Barrier (undeveloped) Federal land designated for the protection of natural ecosystems Administratively Proposed Federal Wilderness Area Spawning areas critical for the maintenance of fish/shellfish species within a river system, bay, or estuary Migratory pathways and feeding areas critical for the maintenance of anadromous fish species within river reaches or areas in lakes or coastal tidal waters in which the fish spend extended periods of time Terrestrial areas utilized by large or dense aggregations of vertebrate animals (semi-aquatic foragers) for breeding National river reach designated as recreational	75
✓	Habitat known to be used by State designated endangered or threatened species Habitat known to be used by a species under review as to its Federal endangered or threatened status Coastal Barrier (partially developed) Federally designated Scenic or Wild River	50
	State land designated for wildlife or game management State designated Scenic or Wild River State designated Natural Area Particular areas, relatively small in size, important to maintenance of unique biotic communities	25
✓	State designated areas for the protection and maintenance of aquatic life under the Clean Water Act	5
✓	Wetlands See SI Table 14 (Surface Water Pathway) or SI Table 23 (Air Pathway)	

*Check (✓) all environments impacted or potentially impacted by the site.

SI TABLE 14 (HRS TABLE 4-24)

SURFACE WATER WETLANDS FRONTAGE VALUES

*	TOTAL LENGTH OF WETLANDS	ASSIGNED VALUE
	Less than 0.1 miles	0
✓	0.1 to 1 mile	25
✓	Greater than 1 to 2 miles	50
	Greater than 2 to 3 miles	75
	Greater than 3 to 4 miles	100
	Greater than 4 to 8 miles	150
	Greater than 8 to 12 miles	250
	Greater than 12 to 16 miles	350
	Greater than 16 to 20 miles	450
	Greater than 20 miles	500

* Check (✓) highest value for each applicable flow characteristic.

Notes:

SURFACE WATER PATHWAY (Concluded)
WASTE CHARACTERISTICS, THREAT, AND PATHWAY SCORE SUMMARY

WASTE CHARACTERISTICS

Score

11. If an Actual Contamination Target (drinking water, human food chain, or environmental threat) exists for the watershed, assign the calculated hazardous waste quantity score, or a score of 100, whichever is greater. If no Actual Contamination Targets exist, assign the hazardous waste quantity score calculated for sources available to migrate to surface water.

Score: 100

12. Assign the highest value from SI Table 3 or SI Table 7 for the hazardous substance waste characterization factors below. Multiply each by the surface water hazardous waste quantity score and determine the waste characteristics score for each threat.

	DWT	HFCT	ET
Substance(s):	Benzo(a)pyrene	Benzo(a)pyrene	Benzo(a)pyrene
Value:	10,000	5E+08	5E+08
From Table:	7	7	7

*Footnote all substances which cannot fit on Table.

13. Multiply the toxicity and hazardous waste quantity scores. Assign the waste characteristics score for each threat from the table below.

Product	WC Score	DWT	HFCT	ET
0	0			
>0 to <10	1			
≥10 to <100	2			
≥100 to <1,000	3			
≥1,000 to <10,000	6			
≥10,000 to <1E+05	10			
≥1E+05 to <1E+06	18			
≥1E+06 to <1E+07	32	✓		
≥1E+07 to <1E+08	56			
≥1E+08 to <1E+09	100			
≥1E+09 to <1E+10	180			
≥1E+10 to <1E+11	320		✓	✓
≥1E+11 to <1E+12	560			
≥1E+12 or greater	1000			

*check (✓) the WC score calculated for each threat

	Substance Value	HWQ	Product	WC Score (from Table)	
Drinking Water Threat (DWT) Toxicity × Persistence	10,000 ×	100 =	1E+06	32	(Maximum of 100)
Food Chain Threat (HFCT) Toxicity × Persistence Bioaccumulation	5E+08 ×	100 =	5E+10	320	(Maximum of 1000)
Environmental Threat (ET) Ecotoxicity × Persistence × Ecobioaccumulation	5E+08 ×	100 =	5E+10	320	(Maximum of 1000)

SURFACE WATER PATHWAY THREAT SCORES

Threat (T)	Likelihood of Release (LR) Score	Targets (T) Score	Pathway Waste Characteristics (WC) Score (determined above)	Threat Score $\frac{LR \times T \times WC}{82,500}$	
Drinking Water (DW)	550	5	32	1.07	(Maximum of 100)
Human Food Chain (HFC)	550	0	320	0	(Maximum of 100)
Environmental (E)	550	30.2875	320	60	(Maximum of 60)

Multiply LR by T and by WC. Divide the product by 82,500 for each threat (T). Sum the threat scores to obtain the surface water pathway score for each watershed/migration route. Select the highest watershed/migration route score. If the pathway score is greater than 100, assign 100.

SURFACE WATER PATHWAY CALCULATION:
(DWT + HFCT + ET) =Ssw

61.07
(Maximum of 100)

SOIL EXPOSURE PATHWAY

Pathway Description and Scoring Notes: Identify all areas of observed contamination. Indicate whether a resident population is associated with the site and characterize the area surrounding the site. Identify the nearby population and any terrestrial sensitive environments located within the target distance limit.

Briefly discuss any sampling events relative to the Soil Exposure Pathway; provide dates of sampling events and a summary of the analytical results and whether an observed release and/or actual contamination targets were documented.

Indicate any assumptions you have made in scoring the Soil Exposure Pathway for this site, or any key factors which influenced your scoring rationale.

Approximately 6,200 people work on the property [10]. Approximately 139,122 people reside within 4-radial miles of the facility [9]. There are no known schools or day-care facilities within 200 ft of an area of observed contamination [5]. The nearest residence is located on Osgood Street approximately 100 ft east of the property. The property is surrounded by a maintained chain-link fence with barbed wire and each entrance has a security station. The three guarded stations provide vehicular and pedestrian access to the property; however, access is restricted to security card holders only. There are no known terrestrial sensitive environments on the property [10].

TtNUS team personnel conducted soil/source sampling as part of the AT&T (former) SI. Please refer to the General Information section of this report for further information regarding sampling results.

Based on the available data, a release of hazardous substances to surficial soils from on-site sources has not been documented. Furthermore, based on site observations and conditions, property access restrictions, distance to the nearest residence, and lack of public use of the property, no impacts to nearby residential populations are known or suspected.

SI TABLE 15a: SOIL EXPOSURE OBSERVED CONTAMINATION SUBSTANCES

Source ID:

Sample ID	Hazardous Substance	Substance Concentration	Bckgrd. ID.	Bckgrd. Conc.	Toxicity	References
				Highest Toxicity		

Notes: No soil exposure observed contamination substances have been identified to date.

SI TABLE 15b: SOIL EXPOSURE RESIDENT POPULATION TARGETS

Notes: Convert all results and SCDM values to µg/kg or ppb. If sum of percent calculated for I or J index is ≥ 100%, consider the residents Level I targets; if sum of I or J index is < 100%, consider the residents Level II targets.

Residence ID: Level I: Level II: Population:

Sample ID	Hazardous Substance	Conc. (µg/kg)	RfD (J index)	% of RfD	Cancer Risk Conc. (I index)	% of Cancer Risk Conc.	References
			Sum of Percents		Sum of Percents		

Notes: No soil exposure resident population targets have been identified to date.

SOIL EXPOSURE PATHWAY WORKSHEET

RESIDENT POPULATION THREAT

LIKELIHOOD OF EXPOSURE	Score	Data Type	Refs
1. OBSERVED CONTAMINATION: If evidence indicates the presence of observed contamination (depth of 2 feet or less), assign a score of 550; otherwise, assign a score of 0. Note that a likelihood of exposure score of 0 results in a soil exposure pathway score of 0.	0		
LE=	0		

TARGETS

2. RESIDENT POPULATION: Determine the number of people occupying residences or attending a school or day-care on contaminated property and within 200 feet of areas of observed contamination (HRS section 5.1.3). Level I: 0 people × 10 = 0 Level II: 0 people × 1 = 0 **Sum=**	0	-	
3. RESIDENT INDIVIDUAL: Assign a score of 50 if any Level I resident population exists. Assign a score of 45 if there are Level II targets but no Level I targets. If no resident population exists (i.e., no Level I or Level II targets), assign a score of 0 (HRS Section 5.1.3).	0	-	
4. WORKERS: Assign a score from the table below for the total number of workers at the site and nearby facilities and within areas of observed contamination associated with the site.	15	+	10

Number of Workers	Score
0	0
1 to 100	5
101 to 1,000	10
>1,000	15

5. TERRESTRIAL SENSITIVE ENVIRONMENTS: Assign a value for each terrestrial sensitive environment (SI Table 16) in an area of observed contamination.			

Terrestrial Sensitive Environment Type	Value
Sum =	0

6. RESOURCES: Assign a score of 5 if any one or more of the following resources is present on an area of observed contamination at the site; assign a score of 0 if none apply. • Commercial agriculture • Commercial silviculture • Commercial livestock production or commercial livestock grazing	0	-	
Sum of Targets T=	15		

Notes:

SOIL EXPOSURE PATHWAY WORKSHEET

NEARBY POPULATION THREAT

LIKELIHOOD OF EXPOSURE		Score	Data Type	Ref.
7. Attractiveness/Accessibility (from SI Table 17 or HRS Table 5-6)	Value: 5		+	10
Area of Contamination (from SI Table 18 or HRS Table 5-7)	Value: 40		+	10
	Likelihood of Exposure (from SI Table 19 or HRS Table 5-8)			
	LE=	5		

TARGETS	Score	Data Type	Ref.
8. Assign a score of 0 if Level I or Level II resident individual has been evaluated or if no individuals live within 1/4 mile travel distance of an area of observed contamination. Assign a score of 1 if nearby population is within 1/4 mile travel distance and no Level I or Level II resident population has been evaluated.	1	+	10
9. Determine the population within a 1-radial mile travel distance that is not exposed to a hazardous substance from the site (i.e., properties that are not determined to be Level I or Level II targets); record the population for each distance category in SI Table 20 (HRS Table 5-10). Sum the population values and multiply by 0.1.	1.11	+	9
Sum of Targets T=	2.11		

Notes:

SI TABLE 16 (HRS TABLE 5-5): SOIL EXPOSURE PATHWAY

TERRESTRIAL SENSITIVE ENVIRONMENT VALUES

*	TERRESTRIAL SENSITIVE ENVIRONMENT	ASSIGNED VALUE
	Terrestrial critical habitat for Federal designated endangered or threatened species National Park Designated Federal Wilderness Area National Monument	100
	Terrestrial habitat known to be used by Federal designated or proposed threatened or endangered species National Preserve (terrestrial) National or State terrestrial Wildlife Refuge Federal land designated for protection of natural ecosystems Administratively proposed Federal Wilderness Area Terrestrial areas utilized by large or dense aggregations of animals (vertebrate species) for breeding	75
	Terrestrial habitat used by State designated endangered or threatened species Terrestrial habitat used by species under review for Federal designated endangered or threatened status	50
	State lands designated for wildlife or game management State designated Natural Areas Particular areas, relatively small in size, important to maintenance of unique biotic communities	25

* - Check (✓) all environments impacted or potentially impacted by the site.

Notes:

SI TABLE 17 (HRS TABLE 5-6):

ATTRACTIVENESS/ACCESSIBILITY VALUES

*	AREA OF OBSERVED CONTAMINATION	ASSIGNED VALUE
	Designated recreational area	100
	Regularly used for public recreation (for example, vacant lots in urban area)	75
	Accessible and unique recreational area (for example, vacant lots in urban area)	75
	Moderately accessible with some public recreation use (may have some access improvements, for example, gravel road)	50
	Slightly accessible with some public recreation use (for example, extremely rural area with no road improvement)	25
	Accessible with no public recreation use	10
✓	Surrounded by maintained fence or combination of maintained fence and natural barriers	5
	Physically inaccessible to public, with no evidence of public recreation use	0

* Check (✓) highest value.

SI TABLE 18 (HRS TABLE 5-7):

AREA OF CONTAMINATION FACTOR VALUES

*	TOTAL AREA OF THE AREAS OF OBSERVED CONTAMINATION (SQUARE FEET)	ASSIGNED VALUE
	< to 5,000	5
	> 5,000 to 125,000	20
✓	> 125,000 to 250,000	40
	> 250,000 to 375,000	60
	> 375,000 to 500,000	80
	> 500,000	100

* Check (✓) highest value.

Note: Total area of observed contamination was determined using the estimated area of contaminated soil in the vicinity of the former tank farm and the caustic cleaning room. Refer to the Source Evaluation section of this report.

Notes:

SI TABLE 19 (HRS TABLE 5-8):

NEARBY POPULATION LIKELIHOOD OF EXPOSURE FACTOR VALUES

Area of Contamination Factor Value	Attractiveness/Accessibility Factor Value						
	100	75	50	25	10	5	0
100	500	500	375	250	125	50	0
80	500	375	250	125	50	25	0
60	375	250	125	50	25	5	0
40	250	125	50	25	5	5	0
20	125	50	25	5	5	5	0
5	50	25	5	5	5	5	0

SI TABLE 20 (HRS TABLE 5-10):

DISTANCE-WEIGHTED POPULATION VALUES FOR NEARBY POPULATION THREAT

Travel Distance Category (miles)	Pop.	NUMBER OF PEOPLE WITHIN THE TRAVEL DISTANCE CATEGORY												Pop. Value
		0	1 to 10	11 to 30	31 to 100	101 to 300	301 to 1,000	1,001 to 3,000	3,001 to 10,001	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	
Greater than 0 to 0.25	11	0	0.1	0.4	1.0	4	13	41	130	408	1,303	4,081	13,034	0.4
Greater than 0.25 to 0.5	59	0	0.05	0.2	0.7	2	7	20	65	204	652	2,041	6,517	0.7
Greater than 0.5 to 1	2,106	0	0.02	0.1	0.3	1	3	10	33	102	326	1,020	3,258	10
													Sum =	11.1

References: [9]
Notes:

SOIL EXPOSURE PATHWAY WORKSHEET (Concluded)

WASTE CHARACTERISTICS

		Score
10.	Assign the hazardous waste quantity score calculated for soil exposure	100
11.	Assign the highest toxicity value from SI Table 15a. Substance(s): _____ Value: _____ From Table: _____	
12.	Multiply the toxicity and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below:	

Product	WC Score	*
0	0	✓
>0 to <10	1	
≥10 to <100	2	
≥100 to <1,000	3	
≥1,000 to <10,000	6	
≥10,000 to <1E+05	10	
≥1E+05 to <1E+06	18	
≥1E+06 to <1E+07	32	
≥1E+07 to <1E+08	56	
1E+08 or greater	100	

WC = 0

RESIDENT POPULATION THREAT SCORE:

(Likelihood of Exposure, Question 1;
Targets = Sum of Questions 2, 3, 4, 5, 6)
(0 x 15 x 0) / 82,500 = 0

$\frac{LE \times T \times WC}{82,500} =$ 0

NEARBY POPULATION THREAT SCORE:

(Likelihood of Exposure, Question 7;
Targets = Sum of Questions 8,9)
(5 x 2.11 x 0) / 82,500 = 0

$\frac{LE \times T \times WC}{82,500} =$ 0

SOIL EXPOSURE PATHWAY CALCULATION:
Resident Population Threat + Nearby Population Threat = 0

(Maximum of 100)

Notes:

AIR MIGRATION PATHWAY

Pathway Description and Scoring Notes: Describe the Air Migration Pathway. Identify the nearest potential receptors of airborne contaminants and the population residing within 4-radial miles of the site. Identify any sensitive environments located within the target distance limit.

Briefly discuss any sampling events relative to the Air Migration Pathway; provide dates of sampling events and a summary of the analytical results and whether an observed release and/or actual contamination targets were documented.

Indicate any assumptions you have made in scoring the Air Migration Pathway for this site, or any key factors which influenced your scoring rationale.

There are no on-site residents associated with the property. The nearest residence is located approximately 100 feet east of the AT&T (former) property. Approximately 6,200 people work on the property [10]. Approximately 139,122 people reside within 4-radial miles of the facility [9]. There are no known schools or day-care facilities within 200 feet of observed contamination [5].

The following table summarizes the estimated population within 4-radial miles of the property.

Estimated Population Within 4-Radial Miles of AT&T (Former)

Radial Distance from AT&T (former) (miles)	Estimated Population
On Site	6,200
> 0.00 to 0.25	11
> 0.25 to 0.50	59
> 0.50 to 1.00	2,106
> 1.00 to 2.00	15,759
> 2.00 to 3.00	50,441
> 3.00 to 4.00	70,746
TOTAL	145,322*

* - Includes on-site workers

[9; 10, p. 12]

The following table summarizes sensitive environments located within 4-radial miles of the property.

Sensitive Environments Located within 4-Radial Miles of AT&T (Former)

Radial Distance from AT&T (former) (miles)	Sensitive Environment/Species (status)
On Site	Clean Water Act 0.4 acre of wetlands
> 0.00 to 0.25	1 acre of wetlands
> 0.25 to 0.50	2 acres of wetlands
> 0.50 to 1.00	38 acres of wetlands
> 1.00 to 2.00	176 acres of wetlands
> 2.00 to 3.00	169 acres of wetlands (1) State endangered species
> 3.00 to 4.00	557 acres of wetlands

[19; 20]

In December 1992, VOC contamination was noted in a former caustic cleaning room in Building 30 by AT&T (Former) workers excavating the floor slab and shallow soil to install new process equipment. In 1993, CDM conducted a soil gas survey in the former caustic cleaning room area. Results indicated that detectable concentrations of TCE above 50 ppbv were present at distances 200 ft from the suspected source. Soil gas concentrations of TCE above 25 ppmv were identified in soils up to 150 ft from the source area[1, p. 3-23]. In addition, quarterly sampling of the ambient building air was instituted to monitor for VOCs [1, pp. iii, vi, 3-1].

In June 1998, CDM conducted another soil gas survey in the area of the former tank farm. Samples were collected from inside Buildings 30, 70, and 71 and outside in the shipping/receiving courtyard [1, p. 3-23]. Again, soil gas survey results indicated that concentrations of TCE above 50 ppb were present at distances 200 ft from the suspected source. Soil gas concentrations of TCE above 25 ppmv were found in soils up to 150 ft from the source area [1, p. 3-23].

In November 1998, 10 ground level ambient air samples were collected by CDM from selected locations inside Buildings 30, 70, and 71. Air samples were analyzed for VOCs using EPA Method TO-15. The indoor air samples were collected using Summa canisters with a 6 liter capacity [1, p. 3-24]. Analytical results indicated TCE at a concentration of 190 ppbv in one sample from Building 71. CDM indicated that this result was a potential health risk if detected in the breathing zone [1, p. 3-26].

In December 1998, three additional ground level ambient indoor air samples were collected in Building 71 to confirm the November 1998 sample results. Analytical results indicated TCE at a concentration of 810 ppbv in one sample [1, p. 3-26].

In response to these results, Lucent initiated a RAM in February 1999 to mitigate infiltration of VOC vapors from beneath the building to the building air. The RAM consisted of sealing all visible cracks in the floor of Buildings 30, 70, and 71. Following the RAM actions, air samples were collected from the breathing zone. According to CDM, no VOCs were detected in the breathing zone at concentrations that posed a significant health risk [1, p. 3-26].

Air samples were collected and analyzed for VOCS by EPA Method TO-15 in 1998. There has been a release of VOCs; however, the latest results indicated no VOCs in the breathing zone. For the purposes of this SI evaluation, it should be noted that the soil gas sample analysis conducted at the property is not considered representative of ambient air conditions. In addition, no elevated readings were detected by the photoionization detector (PID) utilized by TtNUS team personnel during sampling activities. No impacts to nearby residential populations or sensitive environments are known or suspected.

SI TABLE 21a: AIR PATHWAY OBSERVED RELEASE SUBSTANCES

Note: Mobility equals 1 for all observed release substances.

Sample ID	Hazardous Substance	Substance Concentration	Bckgrd. ID.	Bckgrd. Conc.	Gaseous or Particulate	Tox. × Mob. = Tox.	References
					Highest Value		

Notes: No air pathway observed release substances have been identified to date.

SI TABLE 21b: AIR PATHWAY ACTUAL CONTAMINATION TARGETS

Note: Convert all results and SCDM values to µg/m^3 or ppb.
If sum of percents calculated for I or J index is ≥ 100%, consider the targets as Level I; if the sum of I or J index is < 100%, consider the targets as Level II.

Sample ID: Level I: Level II: Distance from Sources (mi): References:

Hazardous Substance	Conc. (µg/m^3)	Toxicity/ Mobility	Benchmark Conc. (NAAQS or NESHAPS)	% of Benchmark	RfD (I index)	% of RfD	Cancer Risk Conc. (J index)	% of Cancer Risk Conc.
	Highest Tox. × Mobility		Highest Percent		Sum of Percents		Sum of Percents	

Notes: No air pathway actual contamination targets have been identified to date.

AIR PATHWAY WORKSHEET

LIKELIHOOD OF RELEASE	Score	Data Type	Refs
1. OBSERVED RELEASE: If sampling data or direct observation support a release to air, assign a score of 550. Record observed release substances on SI Table 21.			
2. POTENTIAL TO RELEASE: If sampling data do not support a release to the air, assign a score of 500. Optionally, evaluate air migration gaseous and particulate potential to release (HRS Section 6.1.2).	500	-	
LR =	500		

TARGETS	Score	Data Type	Refs
3. ACTUAL CONTAMINATION POPULATION: Determine the number of people within the target distance limit subject to exposure from a release of a hazardous substance to the air. Level I: 0 people × 10 = 0 Level II: 0 people × 1 = 0 **Total =**	0	-	
4. POTENTIAL TARGET POPULATION: Determine the number of people within the target distance limit not subject to exposure from a release of a hazardous substance to the air using SI Table 22. Sum the values and multiply by 0.1.	30.9	+	9
5. NEAREST INDIVIDUAL: Assign a score of 50 if there are any Level I targets. Assign a score of 45 if there are Level II targets but no Level I targets. If no Actual Contamination Population exists, assign the Nearest Individual score from SI Table 22.	20	+	9
6. ACTUAL CONTAMINATION SENSITIVE ENVIRONMENTS: Sum the sensitive environment values (SI Table 13) and wetland acreage values (SI Table 23) for environments subject to exposure from the release of a hazardous substance to the air.	0	-	
7. POTENTIAL CONTAMINATION SENSITIVE ENVIRONMENTS: Use SI Table 24 to evaluate sensitive environments not subject to exposure from a release.	1.50925	+	19-24
8. RESOURCES: Assign a score of 5 if one or more air resources applies within ½ mile of a source; assign a score of 0 if none apply. • Commercial agriculture • Commercial silviculture • Major or designated recreation area	5	+	1
Sum of Targets T =	57.41		

Sensitive Environment Type	Value
Wetland Acreage	**Value**

Notes: Based on potential containment factors to the air migration pathway, EPA Site Assessment Manager tasked TtNUS personnel to exclude the on-site employees from this draft SIW evaluation.

AIR PATHWAY WORKSHEET (Concluded)

WASTE CHARACTERISTICS	Score
9. If any Actual Contamination Targets exist for the air pathway, assign the calculated hazardous waste quantity score or a score of 100, whichever is greater; if there are no Actual Contamination Targets for the air pathway, assign the calculated HWQ score for sources available for air migration.	100
10. Assign the highest air toxicity × mobility value from SI Table 21a or SI Table 3. Substance(s): Vinyl Chloride Value: 10,000 From Table: 3	10,000
11. Multiply the highest air toxicity × mobility value and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below:	

Product	WC Score	•
0	0	
>0 to <10	1	
≥10 to <100	2	
≥100 to <1,000	3	
≥1,000 to <10,000	6	
≥10,000 to <1E+05	10	
≥1E+05 to <1E+06	18	
≥1E+06 to <1E+07	32	✓
≥1E+07 to <1E+08	56	
≥1E+08 or greater	100	

WC =	32

Multiply LR by T and by WC. Divide the product by 82,500 to obtain the air migration pathway score. If the pathway score is greater than 100, assign 100.

AIR MIGRATION PATHWAY CALCULATION: $\frac{LR \times T \times WC}{82,500} =$ 11.13

(Maximum of 100)

Notes: (500 x 57.41 x 32) ÷ 82,500 = 11.13

Alternate Scenario: If an observed release to the air migration pathway were documented and the on-site employees were included in the Targets score, then the air migration pathway score would increase to 112.74 (max 100).

(500 x 581.31175 x 32) ÷ 82,500 = 112.74 (max 100)

SI TABLE 22 (FROM HRS TABLE 6-17): VALUES FOR POTENTIAL CONTAMINATION AIR TARGET POPULATIONS

Distance From Site	Pop.	Nearest Individual (choose highest)	NUMBER OF PEOPLE WITHIN THE DISTANCE CATEGORY												Pop. Value
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1000	1001 to 3000	3001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,001 to 3,000,000	
On site	0	20	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455	0
> 0 to 0.25 mile	11	*	1	4	13	41	131	408	1,304	4,081	13,034	40,812	130,340	408,114	4
> 0.25 to 0.5 mile	59	2	0.2	0.9	3	9	28	88	282	882	2,815	8,815	28,153	88,153	3
> 0.5 to 1 mile	2,106	1	0.06	0.3	0.9	3	8	26	83	261	834	2,612	8,342	26,119	26
> 1 to 2 miles	15,759	0	0.02	0.09	0.3	0.8	3	8	27	83	266	833	2,659	8,326	83
> 2 to 3 miles	50,441	0	0.009	0.04	0.1	0.4	1	4	12	38	120	375	1,199	3,755	120
> 3 to 4 miles	70,746	0	0.005	0.02	0.07	0.2	0.7	2	7	28	73	229	730	2,285	73
Nearest Individual =		20												Sum =	309

*Score = 20 if the Nearest Individual is within 1/8 mile of a source; score = 7 if the Nearest Individual is between 1/8 and 1/4 mile of a source.

References:
Notes: Based on potential containment factors to the air migration pathway, EPA Site Assessment Manager tasked TtNUS team personnel to exclude the on-site employees from this draft SIW evaluation.

SI TABLE 23 (HRS TABLE 6-18): AIR PATHWAY VALUES FOR WETLAND AREA

*	WETLAND AREA	ASSIGNED VALUE
	< 1 acre	0
	1 to 50 acres	25
	> 50 to 100 acres	75
	> 100 to 150 acres	125
	> 150 to 200 acres	175
	> 200 to 300 acres	250
	> 300 to 400 acres	350
	> 400 to 500 acres	450
✓	> 500 acres	500

* Check (✓) highest value.
(Check only one)

Notes:

SI TABLE 24: DISTANCE WEIGHTS AND CALCULATIONS FOR AIR PATHWAY POTENTIAL CONTAMINATION SENSITIVE ENVIRONMENTS

DISTANCE	DISTANCE WEIGHT	SENSITIVE ENVIRONMENT TYPE AND VALUE (FROM SI TABLES 13 AND 23)	PRODUCT
On a Source	0.10	× (5) Clean Water Act	0.5
		× (0) 0.4 acre of wetlands	0
> 0 to 0.25 mile	0.025	× (25) 1 acre of wetlands	0.625
		×	
		×	
> 0.25 to 0.5mile	0.0054	× (25) 2 acres of wetlands	0.135
		×	
		×	
> 0.5 to 1 mile	0.0016	× (25) 38 acres of wetlands	0.04
		×	
		×	
> 1 to 2 miles	0.0005	× (175) 176 acres of wetlands	0.0875
		×	
		×	
> 2 to 3 miles	0.00023	× (175) 169 acres of wetlands	0.04025
		× (50) 1 State endangered	0.0115
		×	
> 3 to 4 miles	0.00014	× (500) 557 acres of wetlands	0.07
		×	
		×	
> 4 miles	0	×	
		Total Environments Score =	1.50925

SITE SCORE CALCULATION	S	S^2
GROUNDWATER PATHWAY SCORE (S_{GW})	12.63	159.52
SURFACE WATER PATHWAY SCORE (S_{SW})	61.07	3,729.54
SOIL EXPOSURE PATHWAY SCORE(S_{SE})	0	0
AIR PATHWAY SCORE (S_A)	11.13	123.88
SITE SCORE $\sqrt{\frac{S_{GW}^2 + S_{SW}^2 + S_{SE}^2 + S_A^2}{4}} =$		31.67

COMMENTS:

If an observed release to the air migration pathway was not documented but the on-site employees were included in the Targets score, then the air migration pathway score would increase to 112.74 (max 100) and the overall score would increase to 70.99.

$\sqrt{\frac{(159.52 + 3,729.54 + 0 + 123.88)}{4}} = 31.670$

WARNING!!
EPA has determined that the HRS score of any site that is progressing towards listing on the NPL is confidential. Deliberations regarding scoring or listing issues, the site specific status, and HRS scores cannot be released or discussed with non-Agency persons. For additional guidance see the April 30, 1993 OSWER Directive 9320.1-11.

AT&T (Former)
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